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7/16/98

DECLARATION FOR THE RECORD OF DECISION

FOUR COUNTY LANDFILL

OPERABLE UNIT ONE

Site Name and Location

Four County Landfill, Delong, Fulton County, Indiana.

Statement of Basis and Purpose

This decision document presents the selected interim remedial action for the Four County Landfill Site. The selected remedy was chosen in accordance with the Hazardous Substances Response Trust Fund (IC13-25-4) and the federal Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) 42 USC 9601 et seq, as amended by Superfund Amendments and Reauthorization Act of 1986 (SARA), and is consistent with the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) 40 CFR Part 300 to the extent practicable. This decision is based upon the Administrative Record for the site.

Assessment of the Site

IDEM has determined that actual or threatened releases of hazardous substances from this Site, if not addressed by implementing the interim remedial action selected in this Record of Decision, may present an imminent and substantial endangerment to public health, welfare or the environment.

Description of the Selected Remedy

The remedy selected by the Indiana Department of Environmental Management (IDEM) is Alternative No. 4b, RCRA CAP with Geocomposite Clay Liner (GCL) Over Entire Site; Collect Leachate and Dispose of at a Treatment, Storage, and Disposal Facility (TSDF). This remedy consists of the following:

- RCRA Subtitle C cap with geocomposite layer over entire site
- collection of leachate from lined cells and disposal at TSDF
- storm water controls
- on-site monitoring well abandonment
- soil/sediment consolidation (consolidate and dispose of soil located west of the site and sediments within the drainage control basin)
- deed and groundwater restrictions and access control
- landfill gas monitoring and a passive collection system
- grading and revegetation
- groundwater monitoring

Declaration

The selected remedy is protective of human health and the environment, attains Federal and State requirements that are applicable or relevant and appropriate to this remedial action, and is cost effective.

This remedy utilizes permanent solutions. However, because treatment of the principal threats of the Site was not found to be practicable, this remedy does not satisfy the statutory preference for treatment as a principal element.

Because this remedy will result in hazardous substances remaining on-site, pursuant of Section 121 (c) of CERCLA, a review will be conducted at the site within five years after commencement of the remedial action and at least every five years thereafter to ensure that the remedy continues to provide adequate protection of human health and the environment.

John Hamilton, Commissioner
Indiana Department of Environmental Management

7/16/98
Date

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I. Site Description

The Four County Landfill Site occupies approximately 61.5 acres, including the County and State highway rights-of-way. State Highway 17 divides the property into an eastern and western parcel. Land disposal activities were formerly conducted on approximately 30 acres of the western parcel which has been the focus of investigative activities. The western parcel (the property upon which the landfill is located) is bounded on the east by State Highway 17, on the north by County Highway 525 North, on the west by a county road right-of-way, and on the south by wooded land. The eastern parcel was not landfilled. Figure 1 shows the Site and some of the adjacent property.

II. Site History and Enforcement Activities

The landfill began accepting municipal waste in 1972. The wastes were dumped in un-lined pits and covered with soil. In 1973, the Indiana State Board of Health (ISBH) sent the landfill owner, Mr. Avery Wilkins a notice to Cease and Desist regarding the dumping of barrels of waste solvent. In 1978, EWC, Inc. (Environmental Waste Control) was formed to operate the landfill. Subsequently, the ISBH approved the landfill to accept industrial wastes including plating sludge, asbestos and liquid waste. In 1980, EWC submitted Part A of a RCRA permit to dispose of hazardous waste. The landfill was then accorded interim status under RCRA. From 1982 to 1986, repeated violations of RCRA were noted. In October of 1986, IDEM referred the site to the U. S. Environmental Protection Agency. Also, in 1986, A citizens group called STOP (Supporters to Oppose Pollution) was formed to petition for closure of the landfill.

In 1986 and 1987, three lined landfill cells were constructed for hazardous waste disposal under the interim status permit. Some of the older waste deposits were excavated and placed into the lined cells. In June of 1987, the U.S. EPA determined that the landfill site had released hazardous substances into the environment. In 1988, a civil suit was filed by the U. S. against EWC, Inc. for violations under RCRA. Later, a local environmental group, Supporters to Oppose Pollution (S.T.O.P.), joined in the lawsuit. In March of 1989, the Federal District Court of Northern Indiana ordered the landfill closed and assessed fines of 2.78 million against EWC, Inc. The Court also ordered EWC, Inc. to pay reasonable attorney fees incurred by STOP. EWC, Inc. hired a contractor in an attempt to comply with the court order, but work was stopped in 1991 due to financial difficulties and eventual bankruptcy of the landfill owners.

Numerous site investigations have found the groundwater under the site to be contaminated with VOCs, SVOCs and metals. In November 1991, IDEM hired a contractor to properly collect and dispose of leachate produced by the lined cells as well as conduct maintenance activities at the site. Negotiations began with a group of Potentially Responsible Parties and an Agreed Order was signed and made effective August 13, 1993. The PRPs prepared a Work Plan for an RI/FS at the site. The PRPs also took over the operation and maintenance activities for the site including leachate collection and disposal.

III. Highlights of Community Participation

The Proposed Plan and the documents designated as being the remedial investigation report and the feasibility report were released to the public in April 1998. Throughout the Remedial Investigation, IDEM met frequently with members of S.T.O.P. and the local community. Draft and final work plans and reports were sent to S.T.O.P. These documents were made available to the public in both the Administrative Record and an information repository maintained at the Fulton County Library, Aubbee Branch in Leiter's Ford, Indiana; a copy of the Administrative Record is also maintained in the IDEM File Room in Indianapolis, Indiana The notice of availability of these documents was published in Rochester's *The Sentinel* on April 24, 1998. A public comment period was held from April 17, 1998 through May 17, 1998. A public meeting was held on May 6, 1998. At this meeting, representatives from IDEM answered questions about the Site's conditions and the remedial alternatives under consideration. A follow-up meeting with a workgroup of community members and elected officials was held on May 13, 1998, to discuss the issues of the community in detail.

A response to the comments received during the comment period is included in the Responsive Summary, which is a part of this Record of Decision. This decision document presents the selected remedial action for the Four County Landfill, site in Fulton County, Indiana, chosen in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended (CERCLA), and, to the extent practicable, the National Contingency Plan (NCP). The decision for the Site is based on the Administrative Record.

IV. Scope and Role of the Interim Response Action

The selected remedial action presented in this decision document is an interim action that will address threats from the on-site landfill.

In an effort to expedite the site cleanup, IDEM is using an operable unit approach at the Four County Landfill Site. An operable unit is a number of separate activities undertaken as part of a site cleanup. The operable unit strategy allows remedial activities to take place while the investigation for the complete remedy continues.

The Site has been divided into two distinct operable units: Operable Unit 1, landfill cap, and Operable Unit 2, groundwater. The landfill cap, Operable Unit 1, is the subject of this Record of Decision. The groundwater Operable Unit 2 will include:

- characterization of the nature and extent of site groundwater issues both on-site and off-site; and
- installation of a selected remedy which will adequately address on-site and off-site groundwater contamination.

V. Summary of Site Characteristics

A. Geology

The bedrock in the area is covered by a mantle of unconsolidated deposits. The unconsolidated glacial deposits at the Site are up to 220 feet thick, consisting of four major lithostratigraphic units and the bedrock are described in the following subsections.

Unit A

Stratigraphic Unit A consists of four, distinct subunits of loam and silt loam glacial till that probably represent separate phases of glacial deposition. From top to bottom, the stratigraphy is composed of: (1) a surficial, brown weathered loam till (subunit A1); (2) a mixture of gray, silt loam and loam till (subunits A2 and A22); and (3) a brittle, hard, olive-gray silty till (subunit A3). The average bottom elevation of Unit A is about 740 feet average mean sea level.

Unit B

Stratigraphic Unit B (a glacio-lacustrine sequence) underlies Unit A and is comprised of well-stratified, fine to medium- grained sand and interbedded silt. Unit B has a relatively uniform thickness of 28 to 42 feet and appears to contain three major silt beds: one near the top, a second in the middle portion, and a third marking the base. The average bottom elevation of Unit B is about 714 feet average mean sea level.

Unit C

Unit C consists of glacio-fluvial sediments composed of an upper (upward fining) sequence overlying a lower (upward coarsening) sequence that cuts unconformably and irregularly into an older glacial till (Unit D). The average bottom elevation of Unit C is about 610 feet average mean sea level.

Unit D

Stratigraphic Unit D consists of unconsolidated loam or finer-textured glacial till that has been entirely removed in certain areas, presumably by glacial meltwater scouring. Where present, the till unconformably overlies carbonate bedrock of the Devonian Age. The maximum thickness of Unit D is 47 feet, in the southwest quadrant of the Site. The unit thins abrubtly to the north and is cut out by and gravel in the lower part of Unit C. The basal portion of Unit D is appreciably more clayey and reddish than the upper portion.

Bedrock

Bedrock beneath the site is comprised of carbonate (limestone and dolomite) bedrock of middle Devonian Age, probably of the Detroit River Formation.

B. Hydrogeology

The water table beneath the Site lies generally within Unit B, at an average elevation between 725 to 730 feet average mean sea level. Groundwater monitoring performed between 1989 and 1998 has indicated that the groundwater flow beneath the Site is primarily to the north-northeast with a very gentle horizontal gradient and negligible vertical gradient. Groundwater in Unit A occurs in discontinuous perched zones within stratified intertill sand and gravel deposits.

Nature and Extent of Contamination

Operable Unit One (OU1 RI) sampling was performed both on and surrounding the landfill from August 1993 to December 1997. Groundwater, surface water, air and landfill gas, and residential well samples were collected. Samples were analyzed for Volatile Organic Compounds (VOCs), SemiVolatile Organic Compounds (SVOCs), Metals, PCBs, and pesticides. Groundwater samples were analyzed for Gross Alpha/Beta contamination.

Sediment

Eight on-site and twelve off-site sediment samples were collected during the OU1 RI. On-site sediment samples revealed VOC - (acetone and dichloromethane) and SVOC - (butylbezylphthalate) contaminated sediment in the southwest retention pond. The concentration of total cyanide in on-site sediment samples ranged from non-detectable to 1.8 milligrams per kilogram. Pesticides and PCBs were not detected in on-site sediment samples collected during the OU1 RI.

In off-site sediments, three VOC's (acetone, 4-methyl-2-pentatone and dichloromethane) were detected. The concentration of total cyanide in off-site sediment samples ranged from non-detect to 0.31 milligrams per kilogram. SVOCs, pesticides, and PCBs were not detected in off-site sediment samples.

Surface Water

Seven on-site and four off-site surface water samples were collected during the OU1 RI.

One organic compound, acetone, was detected in one on-site surface water sample at an estimated concentration of 16 micrograms per liter. Silver was found to exceed ambient water quality criteria in surface water samples taken from the northeast drainage basin. Cyanide was not detected in on-site surface water samples.

Three VOCs (carbon disulfide, acetone, and toluene) were detected in off-site surface water samples. SVOC's pesticides, PCBs, and cyanide were not detected in off-site surface water samples collected during the OU1 RI. Silver was found above ambient water quality criteria in off-site surface water samples.

Air and Landfill Gas

Air and landfill gas samples collected during the OU1 RI indicate that VOC (acetone and 1,1-dichloroethene) and methane gas emissions are not a significant threat to human health or the environment. However, they do pose a potential threat, and therefore, must be addressed.

Groundwater

Results of groundwater sampling events in June 1994, April 1995 and October 1995 are contained in the OU1 RI Report. On-site and off-site groundwater monitoring wells were sampled. Groundwater sampling results confirm that VOC, SVOC, and metals contaminated groundwater is present beneath the landfill. The OU2 RI will continue to investigate the extent of groundwater contamination.

VI. Summary of Site Risks

Human Health Risk Assessment

The Human Health Risk Assessment (RA) is an evaluation of the risks, or potential risks posed to public health and welfare posed by the Site if the Site is left unremediated. The purpose of the risk assessment is to provide the required basis to proceed with the feasibility study. An RA for the elements of OU1 was prepared in accordance with the U.S. EPA guidance "Risk Assessment Guidance for Superfund (RAGS), Volume 1: Human Health Evaluation Manual (Part A)".

A summary of the major findings of the RA are presented below:

Unit A, Perched water - Construction Worker Exposure

The estimated incremental cancer risk from incidental ingestion and dermal contact is 2.86E-06 (Mean) and 3.75E-05 (RME), while those for inhalation are 1.5E-06 (Mean) and 1.0E-05 (RME).

Non-carcinogenic risk was found to be less than the hazard index of 1. The hazard indices from incidental ingestion and dermal contact is .00021 (Mean) and .0024 (RME), while those for inhalation are .0059 (Mean) and .037 (RME).

The construction worker incidental ingestion/dermal contact and inhalation pathways are additive. Thus the total estimated incremental cancer risk is 4.3E-06 (Mean) and 4.7E-05 (RME). These estimated risk levels fall within the target cancer risk range of 1.0E-06 to 1.0E-04 established by U.S. EPA. It is important to realize that this scenario assumes that Unit A is breached and standing water is contacted by some sort of unprotected construction activity on Site.

The total hazard indices (HI) are .0061 (Mean) and .039 (RME) which are below 1.0. An HI below 1.0 indicates an acceptable level. An HI above 1.0 indicates a potential for non-carcinogenic effects and suggests further evaluation.

Reasonable Maximum Exposure (RME) is defined as the highest exposure that is reasonably expected to occur at a site.

Hazard Index (HI) is defined as the sum of more than one hazard quotient for multiple substances and/or multiple exposure pathways.

Hazard Quotient (HQ) is defined as the ratio of a single substance exposure level over a specified period of time to a reference dose for that substance derived from a similar exposure period.

Units B and C Groundwater - Residential Scenario - Current Conditions

A residential exposure level was used to determine threats from on-site groundwater. The estimated incremental cancer risk is 3.1E-04 (Mean) and 5.0E-04 (RME). These estimated risk levels fall above the target cancer risk range of 1.0E-06 to 1.0E-04 established by U.S. EPA.

The hazard indices are 3.9 (Mean) and 6.0 (RME) which are above 1.0. An HI below 1.0 indicates an acceptable level. An HI above 1.0 indicates a potential of non-carcinogenic effects and suggests further evaluation. These exceedences relate to the presence of manganese in groundwater.

Units B and C Groundwater - Residential - Future Condition

The estimated incremental cancer risk is 2.4E-04 (Mean) and 8.9E-04 (RME). These estimated risk levels fall above the target cancer risk range of 1.0E-06 to 1.0E-04, but it is important to understand that this scenario is equivalent to drilling a well through the landfill, in the center of the Site and using it to supply a residence.

The hazard indices are 5.5 (Mean) and 7.4 (RME) which are above 1.0. An HI above 1.0 indicates a potential for non-carcinogenic effects and suggests further evaluation. These exceedences relate to the presence of manganese and arsenic in the groundwater.

On-Site Sediment - Occasional Visitors and Trespassers

The estimated incremental cancer risk is 3.2E-08 (Mean) and 4.2E-07 (RME) for the NE Pond and no cancer risks in the SW Pond. These estimated risk levels fall below the target cancer risk range of 1.0E-06 to 1.0E-04 established by U.S. EPA.

The hazard indices are .00021 (Mean) and .00077 (RME) for the NE Pond, and .00012 (mean) and .00034 (RME) for the SW Pond which fall below 1.0. An HI below 1.0 is acceptable. An HI above 1.0 indicates a potential for non-carcinogenic effects and suggests further evaluation.

On-Site Sediment - Industrial Worker

The estimated incremental cancer risk is 1.6E-08 (mean) and 2.4E-07 (RME) for the NE Pond and no cancer risks in SW Pond. These estimated risk levels fall below the target cancer risk range of 1.0E-06 to 1.0E-04 established by U.S. EPA.

The hazard indices are .000038 (Mean) and 5.2E-04 (RME) for the NE Pond, and .000023 (Mean) and 2.3E-04 (RME) in SW Pond shall fall below 1.0. An HI below 1.0 indicates an acceptable level. An HI above 1.0 indicates a potential for non-carcinogenic effects and suggests further evaluation.

Off-Site Sediment - Hikers and Hunters

The estimated incremental cancer risk is 4.2E-08 (Mean) and 5.7E-07 (RME) for the North Sector; 6.2E-08 (Mean) and 1.0E-06 (RME) for the East Sector; and 8.3E-08 and 8.7E-07 for the West Sector. These estimated risk levels fall below the target cancer risk range of 1.0E-06 to 1.0E-04 established by U.S. EPA.

The hazard indices are .000021 (Mean) and 1.3E-04 (RME) which fall below 1.0. An HI below 1.0 is acceptable. An HI above 1.0 indicates a potential for non-carcinogenic effects and suggests further evaluation.

Off-Site Air-Resident

The estimated incremental cancer risk is 3.5E-06 (Mean) and 1.4E-05 (RME). These estimated risk levels fall within the target cancer risk

range of 1.0E-06 to 1.0E-04 established by U.S. EPA.

The hazard indices are .00045 (Mean) and 8.8E-04 (RME) which fall below 1.0. An HI below 1.0 is acceptable. An HI above 1.0 indicates a potential for non-carcinogenic effects and suggests further evaluation.

Summation of Risk

The estimated RME cancer risk for the present cumulative risk scenario for industrial workers is 4.2E-06. This estimated cancer risk is within the target cancer risk range of 1.0E-06 to 1.0E-04 as established by U.S. EPA. The hazard index is below 1.0, which is considered the level of concern.

The estimated RME cancer risk for the present cumulative risk scenario for residents (including residential sediment, air and visitor/trespass exposures) ranges from 1.8E-05 to 2.1E-05 depending on the location of residence. This estimated cancer risk is within the target cancer risk range of 1.0E-06 to 1.0E-04 as established by U.S. EPA. The hazard index is below 1.0, which is considered the level of concern.

For the North Sector which is downgradient of the Site with regard to groundwater, the sum of residential total and current groundwater cancer risk is .00052 (RME) which exceeds the target cancer risk range of 1.0E-06 to 1.0E-04. The RME hazard index for a resident in the North Sector with regard to groundwater is 6.0 which is above 1.0, the level of concern.

ENVIRONMENTAL EVALUATION

The Environmental Evaluation (EE) was performed in accordance with U.S. EPA "RAGS, and Region V" Regional Guidance for Conducting Ecological Risk Assessments" (April 1992) and an Environmental Evaluation Report was prepared in accordance with Section 7.4.2 of the RI/FS Work Plan. The objective of the EE Report was to present a qualitative evaluation of the actual or potential ecological impact, if any, posed by chemicals of potential concern (COCs) on the ecosystem, or parts of the ecosystems, in and around the vicinity of the Site. The EE Report which summarized the findings of the EE was prepared and submitted to IDEM and the U.S. EPA on May 3, 1995 and was approved by IDEM. The conclusions of the EE included the following:

The EE demonstrates that on-site conditions are not impacting the off-Site environment because the concentrations of the parameters studied are generally lower in on-Site sediments and surface water than the concentrations of these parameters in off-Site sediment and surface

water (Tables 7.1 and 7.2). The presently available data indicate that the movement of sediments and surface water from on-Site locations to off-Site locations is not likely to lead to an increase in concentrations of most chemicals of concern in off-site media.

Where the above is not true and on-site concentrations marginally exceed off-Site concentrations, the on-site concentrations are generally below the Site-specific background concentrations. This is especially true for the surface water data.

There appears to be a gradient where concentrations in samples taken near the Site exhibit higher concentrations than samples taken further from the Site. However, since the relatively higher values in the closest samples off-Site are higher than on-Site concentrations reported, the presence of a gradient off-Site is not particularly relevant to the evaluation of present Site conditions. Since metals are persistent in soils and sediment, their presence in either media, but especially sediment, may reflect historic conditions. In other words, off-site gradients may be indicative of some migration under surface water flow conditions that may have existed in the past but are not indicative of current conditions.

The concentrations in off-Site samples were compared to site-specific background, literature background conditions defined by the revealing literature and available criteria for sediments and surface water, and were shown to be within expected ranges in natural soil and of minimal to low biological concern. Movement of sediments or surface water from the on-site areas examined (those areas presently discharging off-site) would be expected to lower existing off-site concentrations due to dilution or flushing action.

The analysis of surface water and sediment representative in Site samples showed reported concentrations of inorganics primarily. Inorganics that have available Federal and State criteria/guidelines showed no exceedences for sediment and one exceedence for surface water (silver). The on-site ponds were not developed as fish habitat. Moreover, the ponds are not a water resource and are not known to sustain sizable fish. Therefore, reported concentrations chemicals in these ponds are
not expected to impact fish. The reported concentrations are also well below concentrations that would affect benthic organisms to a remarkable extent for ponds of this nature. Waterfowl that may frequent ponds in this area would also not be affected. Therefore, reported levels of inorganic surface water and sediment not expected to impact biota.

Due to their limited size and the intermittent nature of the shallow standing water pools, the surface in the off-site wetland areas cannot sustain sizable fish or provide suitable habitat for fish reproduction

rearing. No impact on fish is expected. The concentrations are also considered well below concentrations that would affect benthic organisms.

Only a few organic chemicals were observed in sediment or surface water samples collected during the RI. All reported concentrations were low and none of the detected organic compounds exceeded applicable Federal or State of Indiana water quality criteria.

In general, reported concentrations of chemicals in sediment and surface water in the identified drainage areas both on-site and off-site, are below background and/or available Federal and Indiana criteria. This indicates that these drainage pathways where potential contact with chemicals of concern by biota could occur are not adversely impacted by chemicals on the Site or by chemical migration from the Site.

VII. Description of Alternatives

Remedial action objectives were established in order to determine which types of remedial actions were appropriate for the Four County Landfill Site, and to the extent to which remediation needs to be implemented. These objectives were established by taking into consideration regulations and guidance from federal and state regulatory agencies and findings of the site-specific human health and ecological risk assessment, in order to ensure that the cleanup goals will be sufficiently protective of human health and the environment.

The general remedial action objectives for Operable Unit One that were established for the Four County Landfill Site include:

- Minimizing potential for human exposure to contaminants by eliminating significant exposure routes.
- Reduction of surface water infiltration into the waste deposits.

A. Elements of the Alternatives

Several components were common to all of the alternatives. These common components are:

Deed and Groundwater Restrictions and Access Control

Restrictive Covenants on deeds to the landfill property would be implemented to prevent or limit unacceptable site use and development. Restrictive covenants, written into the landfill property deed, serve to notify any potential purchaser of the landfill property that the land was used for waste disposal and that the land use must be restricted in order to ensure the integrity of the waste containment system.

The specific prohibitions outlined in the restrictive covenant are based on the type of remedial action implemented at the site and how the effectiveness of that remedial action can be improved through deed restrictions. For the Four County Landfill, the major purpose of deed restrictions is to protect the integrity of a cover or cap and prevent groundwater water use. The restrictive covenant should limit development (excavation, excessive vehicular traffic including off-road vehicles and dirt bikes), and groundwater use. Additional deed restrictions may be required for effective implementation of other technologies.

Access controls include items such as perimeter fencing and regular patrolling. The Four County Landfill perimeter is currently fenced with a 6-foot high chain link fence topped with 3-strand barbed wire, with vehicular access gates. Signs are posted at equal intervals along the perimeter of the Site to make clear to potential trespassers that there may be a danger associated with entering the Site.

On-Site Monitoring Well Abandonment

Available records show that a total of 118 monitoring wells, piezometers, and water supply wells have been installed on Site. These wells would be abandoned to eliminate pathways for contaminant migration from the upper to the lower stratigraphic units.

Stormwater Controls

Stormwater controls would be implemented to manage infiltration, run-on and run-off to control erosion, are implemented through grading, revegetation, pumping, diversion, and collection. Collected stormwaters may be discharged, removed, rerouted, or treated depending upon levels of contaminants within the water.

Presently, run-off does not come into contact with the active portion of the landfill and is collected in a series of ditches and drainage control ponds, stored in either the southwest retention pond or the northeast drainage control basin, and is ultimately discharged from the northeast drainage control basin in accordance with a National Pollution Discharge Elimination System (NPDES) Permit.

Soil/Sediment Consolidation (Consolidate and dispose of soil located west of the site and the sediments within the drainage control basins)

A common disposal option for wastes and sediments at landfill sites is consolidation with other landfill material followed by capping. Consolidation may also be a practicable alternative for disposal of wastes or contaminated sediments in undesirable locations (i.e. wetlands). Moreover, this disposal option may be applicable to landfill-derived waste solids such as sediments accumulated at the bottom of leachate holding tanks, filter residues, and investigation-derived waste stored in drums on Site. The objective of consolidation

is to relocate contaminated materials from outlying areas into more central portions of the landfill to minimize the required size of a landfill cap. ARARs such as land disposal restrictions would not be applicable as long as wastes are being managed within the area of contamination.

During off-Site investigative activities conducted as part of OU2, soil contaminated with VOCs was encountered adjacent to the western property boundary.

Use of this technology will include excavation of VOC-impacted soil located adjacent to the western property boundary and consolidation of this soil in the unfilled portion of lined landfill Cell C. This excavation will proceed laterally and vertically until impacted soil is removed to IDEM RCRA clean closure standards. However, the excavation would not proceed below the water table.

The excavated area will be backfilled with clean soil or regraded. Prior to backfilling, confirmatory soil samples will be taken to verify that cleanup objectives have been met.

Should it be determined that it is technically impracticable to excavate soils to pre-determined cleanup levels, then other options would be considered that would be protective of human health and the environment. Specifically, the option of extending the cap to cover remaining VOC contaminated soils would be considered after all soils that can practicably be removed have been excavated and alternate, protective, cleanup goals have been met.

Landfill Gas Monitoring and A Passive Collection System

Gas monitoring wells will be installed that consist of perforated pipe packed in gravel and spaced at set distance intervals around the Site Perimeter. Soil gas monitoring utilizing real-time natural gas meters would provide a means of monitoring potential migration of LFG off site. The levels of LFG and rate of migration could be assessed over time in order to provide a basis for potential remedial action.

A passive LFG control system will be installed that will alter subsurface gas flow paths without using mechanical components. Generally, passive collection systems direct subsurface flow to points of controlled release through the use of high-permeability systems. Flow paths to outside areas are blocked through the use of low-permeability barriers. Passive systems are not used to recover landfill gas, instead their use is to protect the cap from a buildup of gas and control the release of landfill gas to the atmosphere. Typical passive systems are pipe vents and trench vents.

Grading and Revegetation

Grading will be implemented to modify the topography in order to promote positive drainage and control the flow of surface water. A

properly graded surface will channel uncontaminated surface water around the landfill, thereby, minimizing infiltration through the cap. Grading is also the general term for the techniques that would reshape the surface in order to control erosion and to manage surface water infiltration, runon and runoff.

Revegetation will be implemented to stabilize the soil surface and promote evapotranspiration. Revegetation decreases soil erosion by wind and water, reduces sedimentation in stormwater runoff and contributes to the development of a naturally stable surface.

Groundwater Monitoring

Groundwater monitoring will be conducted in order to determine changes in groundwater quality with time.

Upgradient monitoring wells will be installed in a "clean" area so that they may provide representative backround groundwater quality in the aquifer of concern.

Downgradient monitoring wells will be installed near the landfill boundary and in the saturated zone so that any changes in the water quality downgradient due to changes in the upgradient groundwater quality can be determined.

The initial monitoring system will be defined during the design phase in consultation with and subject to approval of IDEM. It will be used to monitor all levels of the aquifer that might be impacted by leakage of leachate from the landfill and would monitor the waters for the substances specified by IDEM. The sampling and analysis plan for this monitoring would be subject to the prior approval of IDEM.

The purpose of the groundwater monitoring system being installed without any groundwater remediation components having been implemented is to determine whether any future remediation of the groundwater would be required. At a minimum, the groundwater monitoring system would have to meet the Indiana requirements for solid waste land disposal facilities (329 IAC 10).

The Feasibility Study identified and evaluated alternatives that could be used to address threats to the study area. There are seven cap alternatives, and three alternatives for managing leachate.

The alternatives that have been evaluated are:

Alternative 1: No Further Action ON CAP; Continue to Collect Leachate From Lined Cells and Dispose of at Treatment Storage and Disposal Facility (TSDF);

* Estimated 30yr Present Worth Cost: $5,160,000
* Estimated Implementation Timeframe: Immediate

The inclusion of the no action alternative is utilized to give IDEM a basis for comparison with other alternatives. This alternative consists of no further activities being conducted at the Four County Landfill Site. This alternative provides for continued collection of leachate from the lined cells and disposal of the leachate at a RCRA TSDF. This alternative will not address the public health threat nor achieve Applicable or Relevant and Appropriate Requirements (ARARs).

Alternative 2: Native Soil Over Unlined Cells; RCRA Subtitle C Cap Over Lined Cells; Continue to Collect Leachate From Lined Cells and Dispose of at TSDF;

* Estimated 30yr Present Worth Cost: $7,107,000
* Estimated Implementation Time frame: 1 year

This alternative consists of:

An additional 18 inches of protective soil cap on top of the existing landfill cover on the unlined cells,

Six inches of topsoil above the protective soil cap with vegetation, such as grass, on the topsoil.

and a RCRA Subtitle C cap on top of the lined cells consisting of:

- 24 inches of clay on top of the refuse,
- a 40 mil Flexible Membrane Liner (FML),
- a geonet drainage layer
- an additional 18 inches of protective soil layer,
- 6 inches of topsoil which will be vegetated.

Alternative 3a: Single Clay Layer Over Unlined Cells; RCRA Subtitle C Cap Over Lined Cells; Continue to Collect Leachate From Lined Cells and Dispose of at TSDF;

* Estimated 30yr Present Worth Cost: $9,307,000
* Estimated Implementation Timeframe: 1 year

This alternative consists of:

- a clay cover or imported clay cover on top of the refuse - in the unlined cells,
- a geonet drainage layer,
- an 18 inch protective soil layer,
- 6 inches of topsoil which will be vegetated;

and a RCRA Subtitle C cap on top of the lined cells consisting of:

- 24 inches of clay on top of the refuse,
- a 40 mil Flexible Membrane Liner (FML),
- a geonet drainage layer
- an additional 18 inches of protective soil layer,

- 6 inches of topsoil which will be vegetated.

Alternative 3b: Single Flexible Membrane Liner (FML) Over Lined Cells; RCRA Subtitle C Cap Over Lined Cells; Continue to Collect Leachate From Lined Cells and Dispose of at TSDF;

* Estimated 30yr Present Worth Cost: $7,827,000
* Estimated Implementation Timeframe: 1 year

This alternative consists of:

- a 40 mil FML barrier layer placed on top of the existing cover on unined cells,
- a geocomposite drainage net,
- 18 inches of protective soil cap,
- 6 inches of topsoil which will be vegetated;

and a RCRA Subtitle C cap on top of the lined cells consisting of:

- 24 inches of clay on top of the refuse,
- a 40 mil Flexible Membrane Liner (FML),
- a geonet drainage layer
- 18 inches of protective soil layer,
- 6 inches of topsoil which will be vegetated.

Flexible membrane liners (FMLs) are synthetic materials that serve as low-permeabilty barrier layerd that reduce surface water infiltration into a landfill. Typically, the permeability value for FMLs is 1.0E-12 cm/sec.

Alternative 3c: Single Geocomposite Clay Liner (GCL) Over Lined Cells; RCRA Subtitle C Cap Over Lined Cells; Continue to Collect Leachate From Lined Cells and Dispose of at TSDF;

* Estimated 30yr Present Worth Cost: $7,967,000
* Estimated Implementation Time frame: 1 year

This alternative consists of:

- a 40 mil geocomposite clay liner (GCL) barrier layer placed on top of the existing cover on unlined cells,
- a geocomposite drainage net,
- 18 inches of protective soil cap,
- 6 inches of topsoil which will be vegetated;

and a RCRA Subtitle C cap on top of the lined cells consisting of:

- 24 inches of clay on top of the refuse,
- a 40 mil Flexible Membrane Liner (FML),
- a geonet drainage layer

- 18 inches of protective soil layer,
- 6 inches of topsoil which will be vegetated.

Geocomposite clay liners (GCLs) are manufactured products that are placed over landfills and typically consist of bentonite between two permeable layers such as felt. When moisture is applied to the product, the bentonite swells and creates a low permeability barrier layer. A typical permeability value for GCL is 1.0E1-09 cm/sec.

Alternative 4a: RCRA Subtitle C Cap with FML Over Entire Site; Continue to Collect Leachate From Lined Cells and Dispose of at TSDF;
* Estimated 30yr Present Worth Cost: $9,037,000
* Estimated Implementation Timeframe: 1 year

This alternative consists of a RCRA Cap constructed over the entire site. The RCRA cap consists of:

- 24 inches of clay on top of the refuse,
- a 40 mil Flexible Membrane Liner (FML),
- a geonet drainage layer
- 18 inches of protective soil layer,
- 6 inches of topsoil which will be vegetated.

Alternative 4b: RCRA Subtitle C Cap with GCL Over Entire Site; Continue to Collect Leachate From Lined Cells and Dispose of at TSDF;
* Estimated 30yr Present Worth Cost: $9,027,000
* Estimated Implementation Timeframe: 1 year

This alternative consists of a RCRA Cap constructed over the entire site. The RCRA cap consists of:

- a GCL on top of the existing layer,
- a 40 mil Flexible Membrane Liner (FML),
- a geonet drainage layer
- 18 inches of protective soil layer,
- 6 inches of topsoil which will be vegetated.

Leachate Alternative Methods

Leachate Management Alternative 1 - No Further Action (Continue to Collect Leachate and Dispose of at Treatment Storage and Disposal Facility)
Note: All Leachate Management Alternatives Include Monitoring Volume of Leachate Generated from the Lined Cells
* Estimated 30yr Present Worth Cost: $367,000
* Estimated Implementation Time Frame: Immediate

This alternative consists of:

- collecting leachate from lined cells, and
- disposing of it at a RCRA approved TSDF

Leachate Management Alternative 2 - Collect and Treat, On-Site, Leachate From Lined Cells and Discharge to On-Site Surface Water

* Estimated 30yr Present Worth Cost: $949,000
* Estimated Implementation Time Frame: 1-2 years

This alternative consists of:

- constructing and operating a leachate extraction and treatment system on-site,
- extracting leachate from the lined cells, and
- discharging treated leachate to the surface waters on the Four County Landfill in compliance with an NPDES permit.

Leachate Management Alternative 3 - Collect Leachate From Lined Cells and Direct Discharge to a Publically Owned Treatment Works (POTW)

* Estimated 30yr Present Worth Cost: $949,000
* Estimated Implementation Time Frame: 1-2 years

This alternative consists of:

- collecting leachate from the lined cells, and
- directly discharging the leachate to a Publically Owned Treatment Works (POTW)

VIII. Summary of Comparative Analysis of Alternatives

In this section the nine evaluation criteria that USEPA uses to evaluate each alternative are discussed. These nine criteria are:

1) Overall protection of human health and the environment. The alternatives are assessed to determine whether they can adequately protect human health and the environment from unacceptable risks.

2) Compliance with ARARs. The alternatives are assessed to determine whether they attain applicable or relevant and appropriate requirements (ARARs) under federal environmental laws and state environmental or facility siting laws or provide grounds for invoking one of the waivers permitted.

3) Long-term effectiveness and permanence. The alternatives are assessed for the long-term effectiveness and permanence they afford, along with the degree of certainty that the alternative

will prove successful.

4) Reduction of toxicity, mobility, or volume through treatment. The degree to which alternatives employ recycling or treatment that reduces toxicity, mobility, or volume is assessed, including how treatment is used to address the principal threats posed by the site.

5) Short-term effectiveness. The short-term impacts of alternatives are assessed considering short-term risks to the community, potential impacts on site workers, potential environmental impacts, and the time until protection is achieved.

6) Implementability. The ease or difficulty of implementing the alternative is assessed by considering technical feasibility, administrative feasibility, and availability of services and materials.

7) Costs. Capital costs, annual operation and maintenance costs, and net present value of capital and O & M costs are assessed.

8) Support agency acceptance. The concerns of the support agency are assessed.

9) Community acceptance. This assessment includes determining which components of the alternatives interested persons in the community support, have reservations about, or oppose.

The first two criteria are the threshold criteria. Each alternative must meet these requirements, unless a specific ARAR is waived, in order to be eligible for selection. The next five criteria are the primary balancing criteria. The last two criteria are the modifying criteria that are to be considered in remedy selection.

A. Overall Protection of Human Health and the Environment

Alternative 1 provides no additional protection of human health and the environment. All waste areas are currently covered with native soils and vegetated which prevents direct contact with the wastes. However, the cover has needed to be repaired periodically to correct erosion problems. The Site is currently fenced which deters unauthorized access. Leachate is currently being collected from the RCRA waste area and disposed of at a RCRA TSDF. Surface soils and impoundment waters have not been found to have been impacted by contaminants. Landfill gas generation at the Site appears to be minimal. Groundwater beneath the Site is impacted with VOCs, SVOCs and metals.

Alternatives 2,3, and 4 would all provide additional protection of human health and the environment. Construction of the caps would prevent direct contact with the waste and reduce leachate generation, thus, reducing the amount of leachate entering the groundwater. The

single barrier cap of alternative 3 would provide additional protection compared to the existing native soil cap of Alternative 2 by further reducing the volume of leachate generated. The RCRA Subtitle C cap of Alternative 4 would provide the greatest measure of environmental protection by reducing the leachate generation in the unlined areas the greatest amount.

B. Compliance with Applicable or Relevant and Appropriate Requirements

Alternative 1 would not comply with ARARs for capping since the existing cap does not provide the reduction of infiltration required for closure of a RCRA facility.

Alternative 2 could meet the ARARs if the native material is reworked and recompacted. The permeability of the cap must be less than 1.0E-5 cm/sec. Alternatives 3a,3b, and 3c would meet the requirements of the ARARs.

Alternatives 4a and 4b would comply with or exceed existing ARARs since a RCRA cap would be provided for the entire Site.

Leachate Management Alternative 1 is the only leachate management alternative which currently complies with ARARs

Leachate Management Alternatives 2 and 3 do not meet the Applicable or Relevant and Appropriate Requirements, and therefore were not chosen.

C. Long-term Effectiveness and Permanence

Alternative 1 provides no further remediation at the Site and does not prevent migration of leachate from unlined areas into groundwater.

All of the caps of Alternatives 2, 3, and 4 would provide long-term protection against direct contact with wastes. Caps placed over the waste areas would reduce surface water infiltration, thereby reducing the leaching of contaminants into the groundwater.

The final landfill cover systems included with Alternatives 4a and 4b fully meet the criteria for providing long-term effectiveness with proper maintenance. The proposed covers would reduce the mobility of the contaminants by covering all the wastes with a RCRA Subtitle C cap and reducing surface water infiltration. A proper landfill cover, along with other source control measures, is the accepted means for minimizing the release of wastes from landfills.

The gas collection and venting that is a part of all alternatives except Alternative 1 reduce the mobility of landfill gas that contains constituents that may be harmful to human health and the environment and may be a safety hazard. The leachate collection system of all alternatives completes the source control that is necessary to proper-

ly reduce the mobility of the contaminants and provides long-term effectiveness.

D. Reduction of Toxicity, Mobility, or Volume Through Treatment

Alternative 1 would not reduce the toxicity, mobility, or volume of materials at the site.

All proposed capping technologies are effective in reducing the mobility of contaminants and the volume of leachate generated, but have no impact on reducing the toxicity and volume of the in-place waste materials. The RCRA Subtitle C cap in alternatives 4a and 4b would be most effective in reducing the mobility and volume of contaminants in any leachate.

E. Short-term Effectiveness

No risk would be posed to construction workers during implementation of Alternative 1.

The short term risk of the remaining alternatives would be the hazard to construction workers during implementation of the remedy. Risks to the environment and the general public during construction would be increased due to potential airborne contaminants. All alternatives would provide the same degree of short-term risk to workers and the public.

F. Implementability

The implementability of Alternative 1 is not a concern since the only activities occurring are those which are currently ongoing.

Implementation of alternatives 2, 3, and 4 would utilize widely available construction materials and equipment. Sources of clay, aggregate, FML liners, geonet and other material required for both the single barrier cap (Alternative 3) and the RCRA cap (Alternatives 2,3, and 4) are common. Monitoring of air and dust, dust control and prevention of run-on and run-off would be required during construction. After construction, maintenance of the caps would be required along with monitoring of landfill gas, leachate, groundwater and surface water. All aspects of these alternatives are easily implementable.

Leachate Management Alternative 1 best meets the criteria for implementability. Leachate management Alternative 3 is more difficult to implement because treatment before discharge to the POTW may be required, and the POTW must be willing and capable to accept the leachate.

G. Cost

The costs of the various alternatives are presented in Section VII. Present worth costs include capital construction costs, engineering, contingencies and annual operations and maintenance (O&M) costs at a 5 percent discount rate over a 30-year period. The alternative with the highest cost is Alternative 3a at $9,307,000. The alternative costing the least is Alternative 1 (No Further Action On Cap) at $5,160,000. Both the highest and lowest cost alternatives were less protective than the chosen remedy, Alternative 4b, at $9,027,000.

H. Support Agency Acceptance

The United States Environmental Protection Agency (USEPA) has been involved throughout the remedial investigation and feasibility study. The USEPA has indicated that Alterative 4b is necessary for this Site. However, the U.S. EPA is not acting as a support agency, therefore, this criteria is not applicable.

I. Community Acceptance

There were several objections raised to the preferred remedy that have been presented by the community concerning the Proposed Plan. The strongest objection raised concerned the capping of the landfill without groundwater contamination being addressed. IDEM has informed the community that OU1 is an interim remedy and not the final remedy. The need to address groundwater concerns will be part of the OU2 Investigation.

Another objection to the Proposed Plan concerned the disposal of the VOC-impacted soils adjacent to the Site in the lined Cell C. The community stressed the need for reassurance from the manufacturer of the FML liner that the VOC-impacted soils would not compromise the liner.

The community has also been vocal about collecting leachate from the unlined cells, and have called for the placement of vertical extraction wells through the wastes. IDEM has stressed that placing vertical extraction wells through the waste deposits for leachate collection may not be safe or practicable. This issue is a groundwater concern that will be addressed as part of the OU2 Investigation.

Overall, the community agrees with the need to construct a RCRA Subtitle C cap over the landfill. The comments that have been received during the Public Meeting and Public Comment Period are answered in the Responsive Summary in Appendix A.

IX. The Selected Remedy

The recommended alternative for the Operable Unit 1 Interim Remedy is Alternative 4b. The evaluation of the nine criteria shows that the best alternatives would be Alternative 4a and 4b. Both alternatives would fully meet the nine criteria except for the reduction of toxicity, mobility or volume through treatment and the short term effectiveness. However, both alternatives would reduce mobility of contaminants. Alternative 4b costs slightly less and it provides slightly greater protection from rainfall percolation into the landfill than Alternative 4a because Alternative 4b uses both GCL and FML technology in its cap. Therefore, Alternative 4b provides the best balance of trade-offs with respect to the nine criteria.

The recommended alternative for leachate management is Leachate Management Alternative 1. It is the only Leachate Management Alternative which currently complies with ARARs. This is the current leachate management practice at Four County Landfill. This alternative is included in all of the alternatives considered. The estimated 30yr present worth cost is included in the alternatives described above.

X. Statutory Determinations

IDEM's primary responsibility at State Cleanup sites is to select remedial actions that protect human health and the environment. Section 121(d)(2) of CERCLA also requires that the selected remedial action for the Site comply with applicable or relevant and appropriate environmental standards under state and federal environmental laws with respect to contaminants remaining on site at completion of the remedy unless a waiver is granted. With respect to ongoing work at the site, it is IDEM's policy to comply with state and federal environmental laws. The selected remedy must also be cost-effective and utilize treatment technologies to the maximum extent practicable. CERCLA also establishes a preference for remedies that include treatment as a principal element. This section discusses the extent to which the selected remedy satisfies these statutory elements.

The Proposed Plan for the Four County Landfill State Cleanup Site was released for public comment in April 1998, and a 30-day long public comment period was provided. The Proposed Plan identified Alternative 4b, in combination with Leachate Management Alternative 1, as the preferred alternative. IDEM reviewed all the comments received during the comment period. Upon review of these comments, it was determined that Alternative 4b should continue to be the alternative of choice.

A. Protection of Human Health and the Environment

The selected response action will be effective in containing the source materials in the landfill that are contributing to contamination at the Site.

The baseline risk assessment performed for the Site identified exposure scenarios that resulted in noncarcinogenic health effects

that may be of concern and cancer risks that exceed the USEPA's suggested risk range of 10^{-4} to 10^{-} for residential/current conditions and residential/future conditions. The scenarios contemplated the use of the contaminated groundwater within the fenced property boundary of the Site as a water supply, analyzing exposures due to 1) ingestion of the water, 2) dermal contact with the water, and 3) inhalation of vapors that might arise from the water.

Since it was known that it was necessary to install a landfill cover system over the wastes, no sampling of the surface soils was done and no risk assessment for exposure to these soils was performed. The landfill cover system and gas and leachate collection systems will provide the required protection from the hazards due to the wastes that are being left in place.

Discharges of landfill cap surface runoff water to surface water will be regulated by the NPDES requirements.

Based on the present levels of contaminants detected in sediment and surface water in the identified drainage areas both on-Site and off-Site, ecological effects appear to be minimal.

B. Compliance with Applicable or Relevant and Appropriate Requirements

Alternative 4b and Leachate Management Alternative 1 will meet all of the identified federal and more stringent state applicable or relevant and appropriate requirements (ARARs).

C. Cost-Effectiveness

IDEM has determined that Alternative 4b, with Leachate Management Alternative 1, is cost-effective. Section 300.430(f)(1)(ii)(D) of the NCP requires USEPA to evaluate cost-effectiveness by comparing all the alternatives that meet threshold criteria (protection of human health and the environment and compliance with ARARs) against three balancing criteria (long-term effectiveness and permanence, reduction of toxicity, mobility, or volume through treatment, and short-term effectiveness). Alternative 4b and Leachate Management Alternative 1 presents the best balance among these factors.

D. Utilization of Permanent Solutions and Alternative Treatment (or Resource Recovery) Technologies to the Maximum Extent Practicable (MEP)

IDEM believes that the alternative selected represents the maximum extent to which permanent solutions can be utilized in a cost-effective manner. The selected alternative provides the best balance of long-term effectiveness and permanence, short term effectiveness, implementability, and cost, as well as support agency (USEPA) and community acceptance. Although the selected alternative does reduce the

mobility of contaminants, the criteria of reduction of toxicity, mobility and volume through treatment is not met.

E. Preference for Treatment as a Principal Element

This remedy does not satisfy the statutory preference for treatment as a principal element of the remedy.

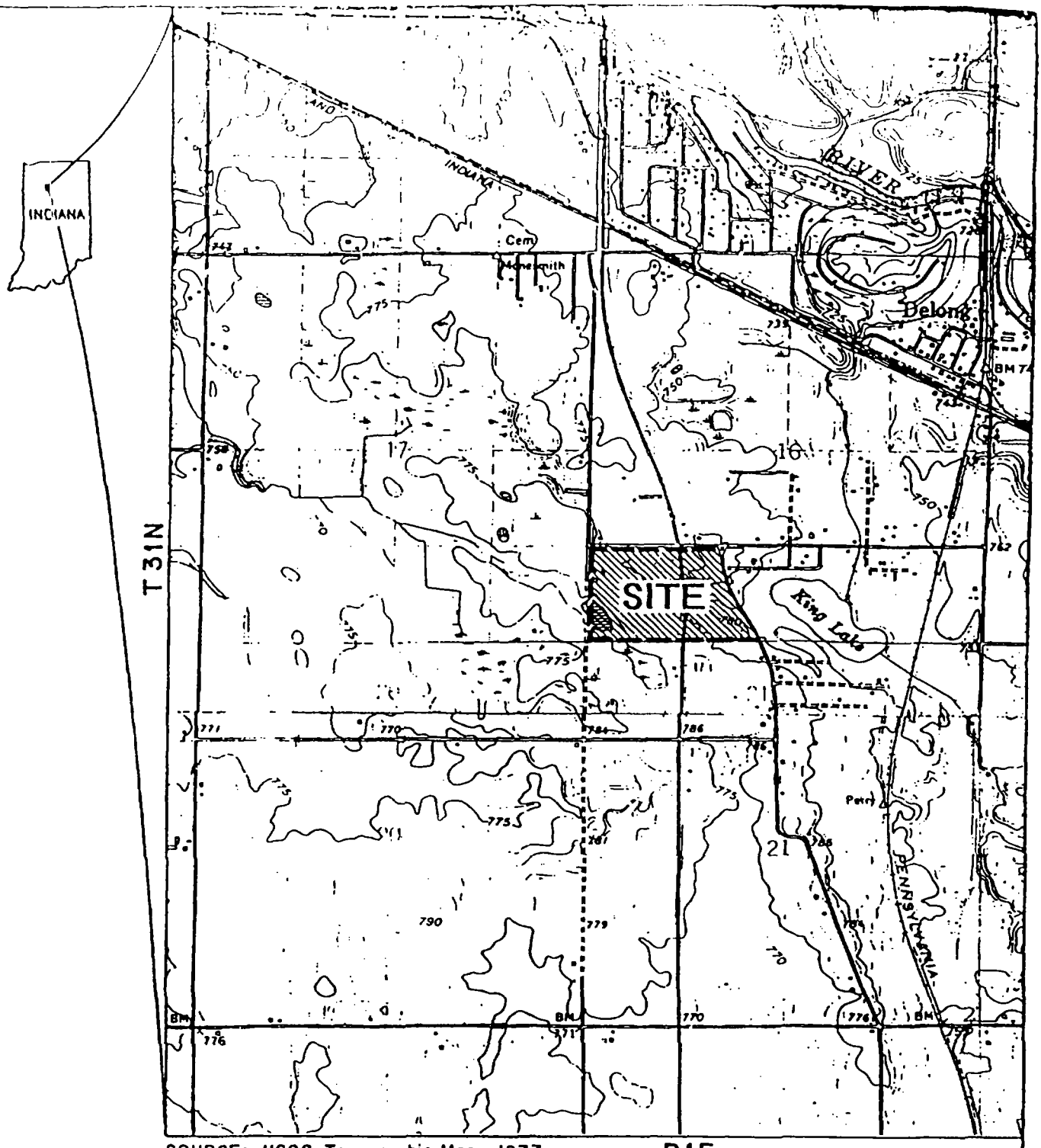
This site is a hazardous waste landfill, and it is generally recognized that containment will be the main method of addressing the wastes.

Collection of leachate and transport to a TSDF for disposal, gas venting and installation of a barrier cover are being used to address the releases and threatened releases at the Site.

XI. Explanation of Change

One change regarding the remedy selected that has been made to what was stated in the Proposed Plan has been the addition of the option to extend the landfill cap to the west and off-Site to cover the VOC contaminated soils. This option provides the necessary flexibility if it is determined that the soils cannot be excavated practicably to IDEM RCRA clean closure criteria and backfilled as in the Proposed Plan. Under this option, most of the contaminated soil mass would be excavated to a practicable level and any remaining soils would be covered under the extended cap. The excavated soils would be placed in the lined Cell C as originally proposed.

FIGURES

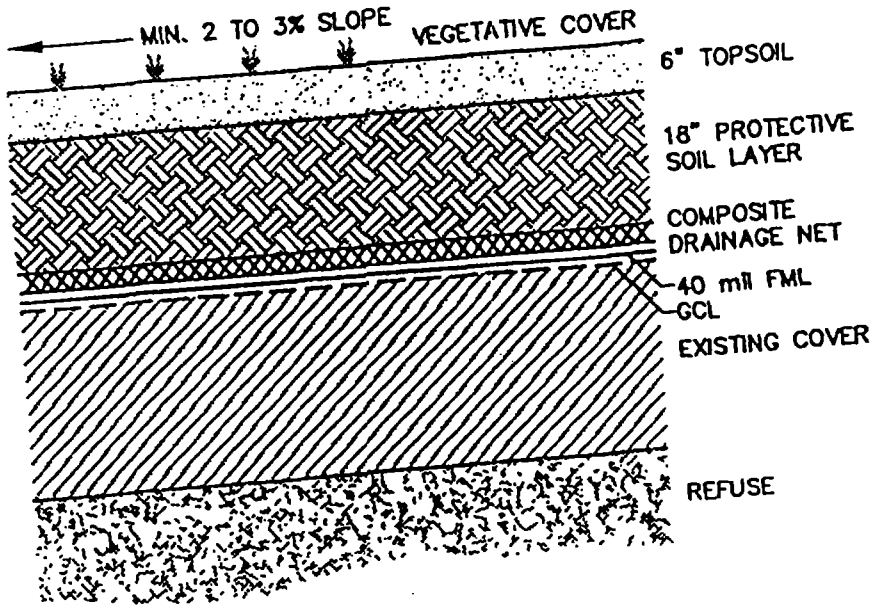


SOURCE: USGS Topographic Map, 1977
Culver (1980) and Kewanna (1977), Ind.

CRA

figure 1

SITE LOCATION
FOUR COUNTY LANDFILL
Fulton County, Indiana



B–FML/GCL

figure 5

RCRA COMPOSITE BARRIER CAP
FOUR COUNTY LANDFILL SITE
Fulton County, Indiana

TABLES

Table 1

POTENTIAL CHEMICAL SPECIFIC ARARs
FOUR COUNTY LANDFILL SITE
FULTON COUNTY, INDIANA

Potential Chemical Specific Requirements	*Citation*
Water Quality Standards (Indiana)	327 IAC 2
Groundwater Protection Standard	40 CFR 264.92
National Primary Drinking Water Regulations	40 CFR 141
National Secondary Drinking Water Regulations	40 CFR 143
Public Water Supply; Drinking Water Standards	327 IAC 8-2

POTENTIAL FEDERAL AND STATE LOCATION-SPECIFIC ARARs[1]
FOUR COUNTY LANDFILL SITE
FULTON COUNTY, INDIANA

Location	*Requirement*	*Citation*	*Applicable, Appropriate or Relevant*
Within 100-year floodplain	Facility must be designed, constructed, operated, and maintained to prevent washout.	40 CFR 264.18(b); 329 IAC 3.1[2]	NA
Within floodplain	Action must avoid adverse effects, minimize potential harm, and if necessary, restore and preserve natural and beneficial values of the floodplain.	Executive Order 11988, Floodplain Management, (40 CFR 6, Appendix A)	NA
Within floodplain in Indiana	Action must avoid adverse effects, minimize potential harm, and restore and preserve natural and beneficial values of the floodplain. Construction of abodes or residences is prohibited and prior approval of the IDNR is required for other types of construction, excavation, or filling in or on a floodway. This includes but is not limited to construction of a fence, water treatment facility, dredging, and/or dewatering in a floodway.	Indiana Flood Control Act (13-2-22)	NA
Wetland	Action must minimize the destruction, loss, or degradation of wetlands and to preserve the value of wetlands.	Executive Order 11990, Protection of Wetlands, (40 CFR 6, Appendix A)	Yes
	Discharge of dredged or fill material into wetlands without permit is prohibited. Water quality certification may also be required from IDEM.	Clean Water Act, Sections 401 and 404; 40 CFR Parts 230, 231	

POTENTIAL FEDERAL AND STATE LOCATION-SPECIFIC ARARs[1]
FOUR COUNTY LANDFILL SITE
FULTON COUNTY, INDIANA

Location	*Requirement*	*Citation*	*Applicable, Appropriate or Relevant*
Critical habitat upon which endangered species or threatened species depends	Action to conserve endangered species or threatened species, including consultation with the Department of Interior	Endangered Species Act of 1973 (16 USC 1531 et. Seq.); 50 CFR Part 200; 50 CFR Part 402 Fish and Wildlife Coordination Act (16 USC 661 et. seq.); 33 CFR Parts 320-330.	NA[3]
Near a coastal zone	Protect land and waters of coastal zones.	Coastal Zone Management Act, 16 USC 1451	NA
Near a designated coastal barrier	Minimize the damage to fish, wildlife and other natural resources associated with the coastal barriers.	Coastal Barrier Resources Act, 16 USC 3501	NA
Near a Federally-owned area designated as a wilderness area	Protect and preserve Federally designated areas as "wilderness areas".	Wilderness Act, 16 USC 1131	NA
Near a National Wildlife Refuge System	Conservation of fish and wildlife including species that are threatened.	Wildlife Refuge, 16 USC 668 dd; . 50 CFR 27	NA

Notes:

[1]Modified from Exhibit 1-2 of USEPA's Draft Guidance CERCLA Compliance With Other Laws (August 1988).

[2]As of February 1992, Indiana adopted new hazardous waste rules titled 329 IAC 3.1, which adopt by reference the Code of Federal Regulations (40 CFR 260 through 270). The State rules generally only cover the administrative procedures while the federal rules cover the standards for RCRA generators and treatment, storage, and disposal facilities.

[3]The National Heritage Program identified a species of mudpuppy listed as a state rare species in a wetland in the vicinity of the landfill.

POTENTIAL FEDERAL AND STATE ACTION-SPECIFIC ARARs[1]
FOUR COUNTY LANDFILL SITE
FULTON COUNTY, INDIANA

Actions	*Requirement*	*Citation*
Air stripping	Design system to provide odor-free operation.	CAA Section 101[2]
	Total organic emissions from air strippers be reduced below 1.4 kg/hour or 2.8 Mg/year (3 pounds/hr. or 3.1 tons/year); or that organic emissions be reduced 95 percent by weight	40 CFR 264 AA
	Register with Commissioner of the State of Indiana to include estimation of emission rates for each pollutant expected.	40 CFR 52[2]; 326 IAC 2-1-2
	Verify through emission estimates and dispersion modeling that hydrogen sulfide emissions do not create an ambient concentration greater than or equal to 0.10 ppm: Emissions standards for Hazardous Air Pollutants (HAPs)	40 CFR 61; 326 IAC 14
	Reduce VOC emissions using best available control technology (BACT) for facilities potentially producing emissions of 25 tons or more per year	326 IAC 8-1-6
	Verify facility specific MACT determination for sources of Hazardous Air Pollutants greater than 10 tons per year.	326 IAC 2-1-3-4
	Prevent significant deterioration using best available control technology, air quality analysis, and an analysis on visibility, soils, and generation for emissions greater than 25 tons per year (TPY) of particulate matter, 20 TPY for particulate <10 microns, 40 TPY VOCs, and 0.6 TPY lead.	40 CFR 131
	Follow RCRA generator standards for manifesting, handling, record keeping, and accumulation times for waste water, if determined to be hazardous.	40 CFR 262.10-262.44; 329 IAC [illegible]
	Treatment of waste water contained in tanks over 90 days would require facility to meet TSD standards.	See Treatment (in a unit), and [illegible] Storage (on site) in this table
Capping	Placement of a cap over a landfill requires a cover designed and constructed to:	40 CFR 264.310(a); 329 IAC 3.1[2]

POTENTIAL FEDERAL AND STATE ACTION-SPECIFIC ARARs[1]
FOUR COUNTY LANDFILL SITE
FULTON COUNTY, INDIANA

Actions	*Requirement*	*Citation*
Capping	Provide long-term minimization of infiltration of liquids through the capped area. Function with minimum maintenance. Promote drainage and minimize erosion or abrasion of the cover. Accommodate settling and subsidence so that the cover's integrity is maintained. Have a permeability less than or equal to the permeability of any bottom liner system or natural subsoils present.	
	Restrict post-closure use of property as necessary to prevent damage to the cover.	40 CFR 264.117(c); 329 IAC 3.1[illegible]
	Prevent run-on and run-off from damaging cover.	40 CFR 264.310(b); 329 IAC 3.1[illegible]
	Protect and maintain surveyed benchmarks used to locate waste cells.	40 CFR 264.310(b); 329 IAC 3.1[illegible]
	Disposal or decontamination of equipment, structures, and soils.	40 CFR 264.114; 329 IAC 3.1[illegible]
Construction Activity	Stormwater runoff associated with construction activity.	327 IAC 15-5
	Fugitive dust emissions during construction activity	326 IAC 64
Closure with waste in place (capping)	Installation of final cover to provide long-term minimization of infiltration.	40 CFR 264.310; 329 IAC 3.1[illegible]
	Stabilize wastes, if necessary, to support cover.	40 CFR 264.228; 40 CFR 264.25[illegible]
	Post-closure care and ground water monitoring.	40 CFR 264.310; 329 IAC 3.1[illegible]
Direct discharge of treatment system effluent	Applicable federal water quality criteria for the protection of aquatic life must be complied with when environmental factors are being considered.	50 CFR 30784
	Applicable federally approved state water quality standards must be complied with. These standards may be in addition to or more stringent than other federal standards under the CWA.	CWA Sections 301, 302, 303, 3[illegible] and 405; 40 CFR 122.44 and state regulations approved under 4[illegible] CFR 131; 327 IAC 5-2-10; 327 IAC 2

POTENTIAL FEDERAL AND STATE ACTION-SPECIFIC ARARs[1]
FOUR COUNTY LANDFILL SITE
FULTON COUNTY, INDIANA

Actions	*Requirement*	*Citation*
Direct discharge of treatment system effluent	The discharge must be consistent with the requirement of a Water Quality Management Plan approved by EPA under Section 208(b) of the Clean Water Act.	CWA Section 208(b); 327 IAC 5-2-1
	Use of best available technology (BAT) economically achievable is required to control toxic and nonconventional pollutants. Use of best conventional pollutant control technology (BCT) is required to control conventional pollutants. Technology-based effluent limitations may be determined on a case-by-case basis. In some cases, the permit limit for a conventional pollutant may be more stringent than BCT.	40 CFR 122.44(a) 327 IAC 5-5-2
	Discharge limitations must be established for all toxic pollutants that are or may be discharged at levels greater than those that can be achieved by technology-based standards.	40 CFR 122.44(e)
	Discharge of pollutants must conform to basic NPDES requirements	327 IAC 5-2-2
	Discharge must be monitored to assure compliance. Discharger will monitor:	40 CFR 122.44(i); 327 IAC 5-2-17
	The mass of each pollutant limited in the permit discharged; The volume of effluent discharged from each outfall; and Frequency of discharge and other measurements as appropriate.	
	The following records must be maintained:	
	Date, place, and time of sampling or measurements; Person(s) who performed sampling or measurement; Date(s) analyses were performed; Person(s) who performed analyses; Analytical techniques or methods used; and Results for measurements and analyses.	327 IAC 5-2-14; 40 CFR 122.41
	The discharge monitoring reports (DMRs) must be submitted to IDEM as required by the permit (at least annually).	327 IAC 5-2-15

POTENTIAL FEDERAL AND STATE ACTION-SPECIFIC ARARs[1]
FOUR COUNTY LANDFILL SITE
FULTON COUNTY, INDIANA

Actions	*Requirement*	*Citation*
Direct discharge of treatment system effluent	Approved test methods for waste constituents to be monitored must be followed. Detailed requirements for analytical procedures and quality controls are provided.	40 CFR 122.44(i); 40 CFR 136 327 IAC 5-2-13(c)
	Permit application information must be submitted, including a description of activities, listing of environmental permits, etc.	40 CFR 122.21(f)
	Comply with additional permit conditions such as:	40 CFR 122.41; 327 IAC 5-2-8
	Duty to mitigate any adverse effects of any discharge; Report to IDEM violations of maximum daily discharge for certain pollutants within 24 hours; and Proper operation and maintenance of treatment systems.	
	Develop and implement a Best Management Practices (BMP) program and incorporate in the NPDES permit to prevent the release of toxic constituents to surface waters.	40 CFR 125.100; 327 IAC 5-9
	The BMP program must:	40 CFR 125.104
	Establish specific objectives for the control of toxic and hazardous pollutant spills; Include a prediction of direction, rate of flow, and total quantity of toxic pollutants where experience indicates a reasonable potential for equipment failure; and	
	Prescribe sample preservation procedures, container materials, and maximum allowable holding times.	40 CFR 136.1-136.4; 327 IAC 5-[illegible]
Discharge to POTW	Pollutants that pass through the POTW without treatment, interfere with POTW operation, or contaminate POTW sludge are prohibited.	40 CFR 403.5; 327 IAC 5-11-1
	Specific prohibitions preclude the discharge of pollutants to POTWs that: Create a fire or explosion hazard in the POTW; Are corrosive (pH<5.0);	40 CFR 403.5(b); 327 IAC 5-12-2(b)

POTENTIAL FEDERAL AND STATE ACTION-SPECIFIC ARARs[1]
FOUR COUNTY LANDFILL SITE
FULTON COUNTY, INDIANA

Actions	*Requirement*	*Citation*
Discharge to POTW	Result in the presence of toxic gases, vapors or fumes in a quantity that may cause health and safety problems; Obstruct flow resulting in interference; Are discharged at a flow rate and/or concentration that will result in interference; and/or Increase the temperature of wastewater entering the treatment plant that would result in interference, or raise the POTW influent temperature above 104°F (40°C).	
	Determine acceptable degree of pretreatment for certain industrial wastewater prior to discharge into a POTW	326 IAC 2-1-3-4
	Discharge must comply with local POTW pretreatment program, including POTW-specific pollutants, spill prevention program requirements, and reporting and monitoring requirements.	40 CFR 403.5, 40 CFR 403.8 and local POTW regulations
	RCRA permit-by-rule requirements may be applicable to discharges of RCRA hazardous wastes to POTWs by truck, rail, or dedicated pipe.	40 CFR 264.71; 40 CFR 264.72, 40 CFR 262; 40 CFR 270.60(C); 40 CFR 261.3(A)(2)(IV), CWA Section 402 or 307(b); 329 IAC 3.1-7[3]
Gas collection	Meet Clean Air Act requirements, and meet state ambient air quality standards.	CAA; 326 IAC 1-3
	Design system to provide odor-free operation.	CAA Section 101[2]; 40 CFR 52
	Establish procedures for review of construction and operation of any source that has the potential to emit criteria air pollutants. Register with State Commissioner to include estimation of emission rates for each pollutant expected.	40 CFR 52[2]; 326 IAC 2
	Meet established limits for VOC emissions. Best Available Control Technology (BACT) is required if emissions exceed 25 tons/year.	326 IAC 8-1

POTENTIAL FEDERAL AND STATE ACTION-SPECIFIC ARARs[1]
FOUR COUNTY LANDFILL SITE
FULTON COUNTY, INDIANA

Actions	*Requirement*	*Citation*
Operation and maintenance (O&M)	Post-closure care to ensure that site is maintained and monitored.	40 CFR 264.118 (RCRA Subpart G 329 IAC 3.1[3]
	Develop Contingency Plan and Emergency Procedures to minimize potential hazards from fires, explosions or any unplanned release during closure and post-closure status.	40 CFR 264 (Subpart D)
Security	Sites should be secured in accordance with this rule which: 1) Requires prevention of unknowing and unauthorized entry of persons or livestock if physical contact with the waste, etc. could cause injury or, if disturbance of the waste, etc. would cause a violation. 2) The facility must have either: A 24 hour surveillance system which continuously monitors and controls entry or an artificial or natural barrier which completely surrounds the active portion and a means to control entry (i.e., a lock) at all times, through the gates or other entrances to the active portion. 3) "Danger - Unauthorized Personnel Keep Out" signs are required at each entrance and other locations sufficient to be seen from any approach, legible from a distance of at least 25 feet.	40 CFR 264.14 329 IAC 3.1-9
Slurry wall	Excavation of soil for construction of slurry wall may trigger cleanup or land disposal restrictions.	See Consolidation, Excavation [illegible] table.
Surface water control and discharge	Prevent run-on, and control and collect runoff from a 24-hour, 25-year storm during closure and post-closure status.	40 CFR 264.301(f)(g)(h)(i). 329 IAC 3.1[3]
	Management of stormwater run-off associated with Construction Activity, and stormwater run-off associated with industrial activity.	327 IAC 15-5 327 IAC 15-6
Tank storage (on-site)[4]	Ensure tanks have sufficient structural strength that they do not collapse, rupture, or fail.	40 CFR 264.190
	Ensure waste is not incompatible with the tank material unless the tank is protected by a liner or by other means.	40 CFR 264.191

POTENTIAL FEDERAL AND STATE ACTION-SPECIFIC ARARs[1]
FOUR COUNTY LANDFILL SITE
FULTON COUNTY, INDIANA

Actions	*Requirement*	*Citation*
Tank storage (on-site)[4]	Provide tanks with secondary containment and controls to prevent overfilling, and maintain sufficient freeboard in open tanks to prevent overtopping by wave action or precipitation.	40 CFR 264.193-194
	Inspect the following: overfilling control, control equipment, monitoring data, waste level (for uncovered tanks), tank condition, above-ground portions of tanks (to assess their structural integrity), leak detection equipment and the area surrounding the tank (to identify signs of leakage).	40 CFR 264.195
	Repair any corrosion, crack, or leak.	40 CFR 264.196
	At closure, remove all hazardous waste and hazardous waste residues from tanks, discharge control equipment, and discharge confinement structures.	40 CFR 264.197
	Storage of banned wastes must be in accordance with 40 CFR 268. When such storage occurs beyond one year, the owner/operator bears the burden of proving that such storage is solely for the purpose of accumulating sufficient quantities to allow for proper recovery, treatment and disposal.	40 CFR 268.50
	Conform with applicable standards for storage of hazardous waste in tank systems	329 IAC 3.1-9-3
Treatment	Standards for miscellaneous units (long-term retrievable storage, thermal treatment other than incineration, open burning, open detonation, chemical, physical, and biological treatment units other than tanks, surface impoundments, or land treatment units) require new miscellaneous units to satisfy environmental performance standards by protection of ground water, surface water, and air quality, and by limiting surface and subsurface migration.	40 CFR 264 (Subpart X), 329 IAC [illegible]
	Requires permit for construction of treatment facility and specifies standards for facility.	327 IAC 3
	Treatment of wastes subject to ban on land disposal must attain levels achievable by best demonstrated available treatment technologies (BDAT) for each hazardous constituent in each listed waste.	40 CFR 268 (Subpart D)

POTENTIAL FEDERAL AND STATE ACTION-SPECIFIC ARARs[1]
FOUR COUNTY LANDFILL SITE
FULTON COUNTY, INDIANA

Actions	*Requirement*	*Citation*
Treatment	Prepare fugitive and odor emission control plan for this action.	CAA Section 101[2]; 40 CFR 52[2]
	Establish procedures for review of construction and operation of any source that has the potential to emit criteria air pollutants. Register with Commissioner of the State to include estimation of emission rates for each pollutant expected.	40 CFR 52[2]; 326 IAC 2
	Verify through emission estimates and dispersion modeling that hydrogen sulfide emissions do not create an ambient concentration greater than or equal to 0.10 ppm: Emissions Standards for Hazardous Air Pollutants (HAPs)	40 CFR 61[2]; 326 IAC 14
Treatment (in a unit)	Meet requirements for design and operating standards for a specified unit in which hazardous waste is treated (see citation).	40 CFR 264.190-264.192 (Tanks 40 CFR 264.601 (Miscellaneous Treatment Unit)
Excavation	Area from which materials are excavated requires characterization and may require cleanup to levels established by closure requirements.	40 CFR 264 Disposal and Closure Requirements; 329 IAC 3.1[2]
	Movement of wastes beyond the site boundary (i.e., outside the landfilled area) may trigger Land Ban requirements and restrictions.	40 CFR 268
	Removal of non-hazardous excavated material from a CERCLA site may qualify the material as special waste and is subject to state regulations for special waste.	329 IAC 10-8
	All listed and characteristic hazardous wastes or soils and debris contaminated by a RCRA hazardous waste and removed from a CERCLA site may not be land disposed until treated as required by Land Ban. If alternative treatment technologies can achieve treatment similar to that required by Land Ban, and if this achievement can be documented, then a variance may not be required.	40 CFR 268
	Transport and disposal of hazardous waste excavated from a CERCLA site will require state administrative and financial assurance and state manifest.	329 IAC 3.1[2]

POTENTIAL FEDERAL AND STATE ACTION-SPECIFIC ARARs[1]
FOUR COUNTY LANDFILL SITE
FULTON COUNTY, INDIANA

Actions	*Requirement*	*Citation*
Excavation	Develop fugitive and odor emission control plan for this action if existing site plan is inadequate.	CAA Section 101[2]; 40 CFR 52[2]
	Particulate emissions from earth moving and material handling activities must be controlled, such that no visible emissions cross the property line and the increase in upward/downward total suspended particulate concentration is limited to 50 $\mu g/m^3$.	326 IAC 6-4
	Register with Commissioner of the State to include estimation of emission rates for each pollutant expected.	40 CFR 52[2]; 326 IAC 2-1-2
Consolidation	Consolidation in storage piles will trigger storage requirements, establishes the maximum time allowed for accumulation of hazardous wastes.	40 CFR 262.34; 40 CFR 268 (Subpart I)
	Placement on or in land outside unit boundary or area of contamination will trigger land disposal requirements and restrictions.	40 CFR 268 (Subpart D)
	Movement of wastes beyond the site boundary (i.e., outside the landfilled area) may trigger Land Ban requirements and restrictions.	40 CFR 268
	Develop fugitive and odor emission control plan for this action if existing site plan is inadequate.	CAA Section 101[2]; 40 CFR 52[2]
	Register with Commissioner of the State to include estimation of emission rates for each pollutant expected.	40 CFR 52[2]; 326 IAC 2-1-2

POTENTIAL FEDERAL AND STATE ACTION-SPECIFIC ARARs[1]
FOUR COUNTY LANDFILL SITE
FULTON COUNTY, INDIANA

Actions	*Requirement*	*Citation*

Notes:

1 Modified from Exhibit 1-3 of USEPA's Draft Guidance CERCLA Compliance With Other Laws (August 1988) and Exhibit 1-3 of CERCLA Compliance With Other Laws, Part II (August 1989).

2 All of the Clean Air Act ARARs that have been established by the Federal government may be covered by matching State regulations. The State may have the authority to manage these programs through the approval of its implementation plans (40 CFR 52).

3 As of February 1992, Indiana adopted new hazardous waste rules titled 329 IAC 3.1, which adopt by reference the federal regulations 40 CFR 260 through 270. Therefore, any reference to these CFR citations implies coverage under the State rules. The State rules generally only cover the administrative procedures while the federal regulations cover the standards for RCRA generators and TSD facilities.

4 Tank storage requirements are for the storage of RCRA hazardous waste. A generator who accumulates or stores hazardous waste on site for 90 days or less in compliance with 40 CFR 262.34(a)(1-4) is not subject to the full RCRA storage requirements.

Key:

CAA = Clean Air Act
CFR = Code of Federal Regulations
CWA = Clean Water Act
IAC = Indiana Administrative Code
TSD = Treatment, Storage, and Disposal

APPENDIX A
RESPONSIVENESS SUMMARY

Responsiveness Summary
Operable Unit One
Four County Landfill State Cleanup Site
Fulton County, Indiana

I. Overview

The Indiana Department of Environmental Management (IDEM) issued a Proposed Plan April 17, 1998 for the Four County Landfill State Cleanup Site and began a 30-day comment period that ended May 17, 1998. The remedial investigation (RI) and feasibility study (FS) that provided the information used for deciding on a preferred remedy had been performed by a group of potentially responsible parties (PRPs) as the result of a settlement reached with the Indiana Department of Environmental Management. IDEM's preferred alternative contained in the Proposed Plan is an interim remedy that addresses all of the site conditions warranting a response action that has been identified so far for the Four County Landfill. This preferred alternative included: deed and groundwater restrictions and access control; a RCRA Subtitle C cap with a geocomposite clay liner over the entire site; landfill gas monitoring and a passive collection system; groundwater monitoring; and leachate collection from the lined cells and disposal at a Treatment Storage and Disposal Facility (TSDF).

Judging from the comments received, both at the May 6th, 1998 public meeting and by mail, there is general agreement with primary components of IDEM's preferred alternative. However, there was an objection to placing VOC contaminated soils in the lined cell C of the landfill. The public is concerned that the VOC contaminated soils would compromise the integrity of the liner.

A further concern was raised about leachate collection from the unlined cells and the feasibility of placing a collection well through the waste deposits in order to collect the leachate. These concerns are addressed below.

II. Summaries of Comments Received and IDEM's Responses

This section summarizes the comments received during the comment period. The Administrative Record contains a copy of the transcript for the public meeting as well as all written comments. The following comments were received by the local environmental group Supporters to Oppose Pollution (S.T.O.P.), and the general public during the public comment period.

1. Comment. In a formal letter by the local environmental action group Supporters to Oppose Pollution (S.T.O.P.), dated May 16, 1998, it was stated that:

"...S.T.O.P. never has opposed a Cap. What we have proposed is the possibility that the Cap will become the complete remedy for the Site. We have always felt that a Cap should be part of the complete closure and clean-up of this Site. We have always argued that a RCRA Subtitle C Cap was the only allowable Cap for this Site, because we feel that it is required by law. We also feel that the only intelligent way to dispose of the leachate that is being generated from this Site; is to dispose of the leachate at a legal Treatment Storage and Disposal Facility."

IDEM Response: IDEM agrees that a RCRA Subtitle C landfill cap, as presented in the Proposed Plan, would be the most protective of all capping alternatives considered.

The remedial action presented in this Record of Decision is defined as an interim remedy. A final remedy for the site will be determined after the OU2 Investigation has been completed.

IDEM agrees that the best method of leachate disposal is at a TSDF.

2. **Comment.** The Historical Record has to be changed to include the results from the 1994 and 1995 split samples pulled by IDEM and the PRPs.

IDEM Response: The results of the 1994 and 1995 split sampling data is included in Appendix C of this Record of Decision.

3. **Comment.** Heritage Environmental Services (or any other member of the Heritage Group) no longer allowed to do the testing and/or laboratory work required for this Site.

IDEM Response: IDEM cannot deny the PRP group the use of any laboratory they may choose as long as that laboratory follows proper quality assurance and quality control (QA/QC) procedures. IDEM will continue to take splits of selected samples with the PRPs in order to insure consistency of all reported sampling data. The analysis of the split samples will be conducted at a laboratory different from the laboratory selected by the PRPs.

4. **Comment.** VOC contaminated soil - a letter is needed from the manufacturer of the liner material used in Cell C, stating whether or not these VOC's will compromise the liner.

IDEM Response: A letter from the manufacturer of the liner material stating that the liner would not be compromised by the VOC contaminated soils is included in the Administrative Record.

5. **Comment.** Off-site contamination needs to be addressed immediately and the community informed about the potential

hazards that exist. Synergistic effects between two or more different contaminants needs to be explained to the public.

IDEM Response: Possible off-site contamination of groundwater will be further addressed in the OU2 Investigation.

Data on synergistic effects between two or more different contaminants are not well enough established to make clear and reliable assumptions for the determination of risk. Risk assessment guidance currently does not offer methods of determining the synergistic effects of site contaminants. However, overall risk for any given scenario at a site is determined by the total additive quantity of individual risk values of each contaminant of concern in which human health risk was evaluated.

6. **Comment.** More perimeter monitoring wells placed before all on-site wells are abandoned.

IDEM Response: The abandonment of on-site monitoring wells have no bearing on perimeter groundwater conditions. The data obtained from on-site monitoring wells are sufficient to justify the response action presented in this Record of Decision.

Perimeter compliance monitoring wells will be required by IDEM for OU1. The locations of perimeter monitoring wells will be determined during the OU1 design phase.

7. **Comment.** More off-site monitoring wells be placed further to the north-northeast than the existing wells.

IDEM Response: The location of additional off-site monitoring wells will be addressed as part of the OU2 Investigation.

8. **Comment.** Minimum of a 30-year monitoring system, with quarterly monitoring required.

IDEM Response: The groundwater monitoring system (including minimum monitoring requirements) will be defined during the design phase in consultation with and subject to approval by IDEM.

9. **Comment.** Collection of leachate from unlined cells and the off-site contamination plume.

IDEM Response: The chosen remedy provides for the collection of leachate from the lined cell areas. The necessity and/or practicability of subsurface drains down gradient of the landfill or extraction wells drilled through the waste deposits, in order to collect leachate from unlined cells, will be addressed as part

of the OU2 Investigation.

Possible off-site contamination will be addressed as part of the OU2 Investigation.

10. Comment. Water supply for any contaminated off-site wells. Taking into account that some of these wells supply water for not only human consumption, but also water to garden vegetables and livestock.

IDEM Response: In the event that any off-site residential wells should exhibit contamination above maximum contaminant levels (MCLs) due to releases from the Four County Landfill, IDEM would respond appropriately. The appropriate response would be to provide an alternate, safe drinking water supply for affected residents.

11. Comment. How does large irrigation wells in the area effect the groundwater flow?

IDEM Response: Considering the distance from the landfill that the nearest irrigation wells operate, it should not be assumed that these wells affect groundwater flow patterns in the immediate vicinity of the landfill. However, IDEM agrees that this issue should be addressed as part of the OU2 Investigation.

12. Comment. How will the run-off from this cap be handled? Remembering it is against Indiana law to divert run-off onto another persons property.

IDEM Response: Run-off diversion will be addressed during the OU1 design phase. IDEM recognizes that run-off from the landfill must not flood adjacent properties.

Presently, run-off does not come into contact with the active portion of the landfill and is collected in a series of ditches and drainage control pods, stored in either the southwest retention pond or the northeast drainage control basin. The run-off is ultimately discharged from the northeast drainage control basin in accordance with a NPDES permit.

13. Comment. How will the final remedy handle the seasonal rise and fall of the groundwater underlying the Site? How will this effect the movement of contamination?

IDEM Response: The final remedy for the Four County Landfill will be determined after OU1 and the OU2 Investigation are complete. IDEM agrees that seasonal groundwater fluctuations may mobilize contaminants during periods in which the water table is high and able to come into contact with waste deposits normally above the

water table. This issue will be addressed further as part of the OU2 Investigation.

14. Comment. Notify S.T.O.P. in writing of any procedural changes which would effect or nullify any of the existing or future legal documents (i.e...OU2 Investigative Study, Record of Decision, Agreed Order OU1, etc...).

IDEM Response: IDEM agrees that S.T.O.P. should be notified of any significant changes to the above concerns.

15. Comment. There were numerous comments from the general public that called for the excavation and removal of all the wastes from the landfill and implied that capping the landfill is a "cover-up" of the problem.

IDEM Response: Due to the engineering impracticability and prohibitive cost of excavating an entire landfill and disposing of those wastes, IDEM did not consider excavation of the landfill wastes as a remedy alternative. U.S. EPA guidance suggests the use of capping technologies to reduce surface water infiltration, thus mitigating leachate generation and subsequent mobilization of contaminants into the groundwater; control emissions of gas and odors; reduce erosion; improve aesthetics; and provide a stable surface that prevents direct contact with wastes. IDEM believes that the chosen remedy meets EPA guidance criteria for landfill caps and is protective of human health and the environment.

No examples of complete excavation of landfill wastes were found in the review of remedial actions outlined in the Records of Decision listed in Appendix B of the U.S. EPA Guidance manual on *Conducting Remedial Investigations/Feasibility Studies for CERCLA Municipal Landfill Sites*, dated February 1991.

The following comments were submitted on behalf of the Four County Landfill Group in a letter dated May 15, 1998.

16. Comment. The Group believes that IDEM's use of the term " interim remedy" when referring to the OU1 remedy is misleading to the public and incorrect.

IDEM Response: IDEM does not consider capping of the landfill site a final remedy since groundwater concerns both on-site and off-site have not been thoroughly addressed. Only after the OU2 Investigation is complete will IDEM determine what constitutes a final remedy for the Site.

17. Comment. IDEM's comments regarding on-site and off-site sediment sample results are misleading.

IDEM Response: This is a problem of concentration. While acetone, dichloromethane and butylbenzylphthalate are recognized laboratory contaminants, the concentration of these contaminants in the sediment samples are higher than any acceptable laboratory contamination. The metals were also in a different media than the normal media, that being undisturbed soil. Therefore these contaminants are compounds of concern and need attention beyond a simple statement of laboratory contaminants.

18. Comment. IDEM's comments regarding the presence of contaminants in surface water are misleading.

IDEM Response: Water samples are rarely contaminated in the laboratory due to the nature of the analysis. The presence of acetone, carbon disulfide and toluene in a water sample is cause for concern, since either the sample vial had been contaminated before sample collection or that the laboratory was very lax in good laboratory practices. It also may be true that the discharge is acceptable but the contained contamination may not.

19. Comment. IDEM's comments regarding the potential threats associated with air and landfill gas are misleading.

IDEM Response: IDEM agrees that VOC and methane gas emissions are not a significant threat to human health or the environment. However, a remedial action is required to mitigate the build-up of gases under the landfill, once the cap is placed. EPA guidance suggests that landfill gas should be collected when: homes or buildings are adjacent or close to the landfill; when wastes have a high organic content; and when gas pressure building under the cap can damage it and/or curb vegetative growth on the cap.

20. Comment. On-Site monitoring well abandonment should not be addressed as part of the OU1 Proposed Plan.

IDEM Response: The abandonment of on-site monitoring wells are necessary for the construction of the landfill cap. This is regardless of who constructed the wells or how the wells were constructed and if they are serving as conduits for contaminant migration into the B and C aquifers. Therefore, IDEM believes that well abandonment should be included in the OU1 Proposed Plan.

21. Comment. IDEM's proposed remedy for leachate management should provide flexibility for off-site management options.

IDEM Response: Should the need arise to consider Leachate

Management Alternative 3, IDEM will consider the feasibility of this option and whether or not ARARs can be met.

TABLE 1 (Continued)

ANALYTICAL RESULTS FOR VOLATILE ORGANIC COMPOUNDS IN GROUNDWATER

Analyte	Well:	P27A		P27C3		P28C1		P29A		P30C1		MCL
	Date:	June 1994		October 1995		June 1994		June 1994		June 1994		
	Laboratory:	IDEM	PRP	IDEM	PRP	IDEM	PRP	IDEM	PRP	IDEM	PRP	
Acetone		20 U	5,000 U	ND	NA	20 U	10 U	20 U	10 U	20 U	10 U	--
Benzene		1.0 U	4,900	ND	NA	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	5
2-Butanone		10 U	5,000 U	ND	NA	10 U	10 U	10 U	10 U	10 U	10 U	--
Carbon tetrachloride		1.0 U	1,800	ND	NA	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	5
Chloroethane		10 U	500 U	ND	NA	10 U	1.0 U	10 U	3.8	10 U	1.0 U	--
Chloroform		1.0 U	3,000	ND	NA	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	--
1,1-Dichloroethane		1.0 U	500 U	ND	NA	1.0 U	1.0 U	27	30	1.0 U	1.0 U	--
1,2-Dichloroethane		NA	7,100	ND	NA	1.0 U	1.0 U	11	12	1.0 U	1.0 U	5
1,2-Dichloroethene		1.0 U	500 U	ND	NA	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	70; 100
Methylene chloride		10 U	850	3	NA	10 U	1.0 U	10 U	1.0 U	10 U	1.0 U	5
4-Methyl-2-pentanone		10 U	5,000 U	ND	NA	10 U	10 U	10 U	10 U	10 U	10 U	--
Tetrachloroethene		1.0 U	500 U	ND	NA	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	5
Tetrahydrofuran		10 U	NA	ND	NA	10 U	NA	10 U	NA	10 U	NA	--
Toluene		NA	500 U	ND	NA	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1,000
1,1,2-Trichloroethane		1.0 U	500 U	ND	NA	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	5
Trichloroethene		1.0 U	500 U	ND	NA	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	5
Vinyl chloride		5.0 U	500 U	ND	NA	5.0 U	1.0 U	5.0 U	1.0 U	5.0 U	1.0 U	2

All values are given in micrograms per liter (μg/L)

TABLE 1 (Continued)

ANALYTICAL RESULTS FOR VOLATILE ORGANIC COMPOUNDS IN GROUNDWATER

Analyte	Well:	P30C3		P31C1		P31C2		P31C3		P34 *A		MCL
	Date:	October 1995		June 1994		June 1994		April 1995		April 1995		
	Laboratory:	IDEM	PRP	IDEM	PRP	IDEM	PRP	IDEM	PRP	IDEM	PRP	
Acetone		ND	NA	20 U	10 U	20 U	10 U	20 U	10 U	20 U	10 U	--
Benzene		ND	NA	1.0 U	5.3 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	5
2-Butanone		ND	NA	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	--
Carbon tetrachloride		ND	NA	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	5
Chloroethane		ND	NA	10 U	1.0 U	10 U	1.0 U	10 U	1.0 U	10 U	1.0 U	--
Chloroform		ND	NA	1.0 U	1.1 J	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	--
1,1-Dichloroethane		ND	NA	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	--
1,2-Dichloroethane		ND	NA	1.0 U	13 U	170	100	270	360	1.0 U	1.0 U	5
1,2-Dichloroethene		ND	NA	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	70; 100
Methylene chloride		2	NA	10 U	1.0 U	10 U	1.0 U	10 U	1.0 U	10 U	1.0 U	5
4-Methyl-2-pentanone		ND	NA	10 U	10 U	10 U	10 U	10 U	10 U	10 U	10 U	--
Tetrachloroethene		ND	NA	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	5
Tetrahydrofuran		ND	NA	10 U	NA	10 U	NA	10 U	ND	10 U	NA	--
Toluene		1	NA	1.0 U	1.0 U	1.0 U	1.0 U	NA	1.0 U	1.0 U	1.0 U	1,000
1,1,2-Trichloroethane		ND	NA	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	5
Trichloroethene		ND	NA	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	5
Vinyl chloride		ND	NA	5.0 U	1.0 U	5.0 U	1.0 U	5.0 U	2.4	5.0 U	1.0 U	2

All values are given in micrograms per liter (μg/L)

TABLE 1 (Continued)

ANALYTICAL RESULTS FOR VOLATILE ORGANIC COMPOUNDS IN GROUNDWATER

	Well:	P34C3		P34*C3		MW21L		MW(P)23C1		MW25B		
	Date:	October 1995		October 1995		June 1994		June 1994		June 1994		
Analyte	Laboratory:	IDEM	PRP	IDEM	PRP	IDEM	PRP	IDEM	PRP	IDEM	PRP	MCL
Acetone		NA	NA	ND	NA	20 U	10 U	20 U	10 U	20 U	10 U	--
Benzene		NA	NA	ND	NA	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	5
2-Butanone		NA	NA	ND	NA	10 U	10 U	10 U	10 U	10 U	10 U	--
Carbon tetrachloride		NA	NA	ND	NA	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	5
Chloroethane		NA	NA	ND	NA	10 U	1.0 U	10 U	1.0 U	10 U	1.0 U	--
Chloroform		NA	NA	ND	NA	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	--
1,1-Dichloroethane		NA	NA	ND	NA	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	--
1,2-Dichloroethane		NA	NA	ND	NA	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	5
1,2-Dichloroethene		NA	NA	ND	NA	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	70; 100
Methylene chloride		2	NA	1.0	NA	10 U	1.0 U	10 U	1.0 U	10 U	1.0 U	5
4-Methyl-2-pentanone		NA	NA	ND	NA	10 U	10 U	10 U	10 U	10 U	10 U	--
Tetrachloroethene		NA	NA	ND	NA	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	5
Tetrahydrofuran		NA	NA	ND	NA	10 U	NA	10 U	NA	10 U	NA	--
Toluene		1	NA	ND	NA	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1,000
1,1,2-Trichloroethane		NA	NA	ND	NA	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	5
Trichloroethene		2	NA	ND	NA	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	1.0 U	5
Vinyl chloride		NA	NA	ND	NA	5.0 U	1.0 U	5.0 U	1.0 U	5.0 U	1.0 U	2

All values are given in micrograms per liter (μg/L)

TABLE 1 (Continued)

ANALYTICAL RESULTS FOR VOLATILE ORGANIC COMPOUNDS IN GROUNDWATER

Analyte	Well:	MW28B		MW33B		MCL
	Date:	June 1994		June 1994		
	Laboratory:	IDEM	PRP	IDEM	PRP	
Acetone		20 U	10 U	20 U	210 J	--
Benzene		1.0 U	1.0 U	1.0 U	1.0 UJ	5
2-Butanone		10 U	10 U	10 U	10 UJ	--
Carbon tetrachloride		1.0 U	1.0 U	1.0 U	1.0 UJ	5
Chloroethane		10 U	1.0 U	10 U	1.0 UJ	--
Chloroform		1.0 U	1.0 U	1.0 U	1.4 J	--
1,1-Dichloroethane		1.0 U	1.0 U	1.0 U	1.0 UJ	--
1,2-Dichloroethane		1.0 U	1.0 U	7.0	3.4 J	5
1,2-Dichloroethene		1.0 U	1.0 U	1.0 U	1.0 UJ	70; 100
Methylene chloride		10 U	1.0 U	10 U	1.0 UJ	5
4-Methyl-2-pentanone		10 U	10 U	10 U	10 UJ	--
Tetrachloroethene		1.0 U	1.0 U	1.0 U	1.0 UJ	5
Tetrahydrofuran		10 U	NA	10 U	NA	--
Toluene		1.0 U	1.0 U	1.0 U	1.0 UJ	1,000
1,1,2-Trichloroethane		1.0 U	1.0 U	1.0 U	1.0 UJ	5
Trichloroethene		1.0 U	1.0 U	1.0 U	1.0 UJ	5
Vinyl chloride		5.0 U	1.0 U	5.0 U	1.0 UJ	2

Notes:

IDEM	=	Indiana Department of Environmental Management
PRP	=	Potentially responsible party
MCL	=	Maximum contaminant level; MCLs for 1,2-dichloroethene are for cis- and trans- isomers; "--" if no MCL exists
U	=	Analyte sought but not found; associated number is reporting limit
J	=	Result estimated for quality control reasons
ND	=	Analyte sought but not found; no reporting limit available
NA	=	Either sample was not analyzed or value not available

Two numbers in an entry are for field duplicate samples giving different results.
Acetone, 2-butanone, and methylene chloride are common laboratory contaminants; positive results for these chemicals may be artifacts.

All values are given in micrograms per liter (μg/L)

TABLE 2

ANALYTICAL RESULTS FOR SEMIVOLATILE ORGANIC COMPOUNDS IN GROUNDWATER

Analyte	Well:	P1A		P2A		P2B		P4B		P5B		MCL
	Date:	June 1994		June 1994		June 1994		June 1994		June 1994		
	Laboratory:	IDEM	PRP	IDEM	PRP	IDEM	PRP	IDEM	PRP	IDEM	PRP	
Aniline		10 U	NA	1,100; 760	NA	10 U	NA	10 U	NA	17 U	NA	--
Benzoic acid		10 U	NA	980; 1,300	NA	10 U	NA	10 U	NA	17 U	NA	--
Di-n-butylphthalate		10 U	10 U	100 U	10 U	10 U	10 U	10 U	10 U	17 U	10 U	--
Bis(2-ethylhexyl)phthalate		67	10 U	100 U; 80	10 U	90	10 U	10 U	10 U	17 U	10 U	--
Hexachloroethane		10 U	10 U	100 U	10 U	10 U	10 U	10 U	10 U	17 U	10 U	--
Isophorone		10 U	10 U	100 U; 12	11; 12	10 U	10 U	10 U	10 U	17 U	10 U	--
4-Methylphenol		10 U	10 U	100 U	49	10 U	10 U	10 U	10 U	17 U	10 U	--
Nitrobenzene		10 U	10 U	100 U	270 J; 260 J	10 U	10 U	10 U	10 U	17 U	10 U	--
Phenol		10 U	10 U	450; 580	220 J	10 U	10 U	10 U	10 U	17 U	10 U	--

Analyte	Well:	P5C2		P7B		P8C1		P8C3		P10 (D2I)		MCL
	Date:	April 1995		June 1994		June 1994		October 1995		June 1994		
	Laboratory:	IDEM	PRP	IDEM	PRP	IDEM	PRP	IDEM	PRP	IDEM	PRP	
Aniline		10 U	NA	10 U	NA	10 U	NA	NA	NA	10 U	NA	--
Benzoic acid		10 U	NA	10 U	NA	10 U	NA	NA	NA	10 U	NA	--
Di-n-bultyphthalate		10 U	10 U	10 U	10 U	10 U	10 U	NA	NA	10 U	10 U	--
Bis(2-ethylhexyl)phthalate		10 U	10 U	10 U	10 U	10 U	10 U	NA	NA	10 U	10 U	--
Hexachloroethane		10 U	10 U	10 U	10 U	10 U	10 U	NA	NA	10 U	120	--
Isophorone		10 U	10 U	10 U	10 U	10 U	10 U	NA	NA	10 U	10 U	--
4-Methylphenol		10 U	10 U	10 U	10 U	10 U	10 U	NA	NA	10 U	10 U	--
Nitrobenzene		10 U	10 U	10 U	10 U	10 U	10 U	NA	NA	13	940 J	--
Phenol		10 U	10 U	10 U	10 U	10 U	10 U	NA	NA	10 U	10 U	--

All values are given in micrograms per liter ($\mu g/L$)

TABLE 2 (Continued)

ANALYTICAL RESULTS FOR SEMIVOLATILE ORGANIC COMPOUNDS IN GROUNDWATER

All values are given in micrograms per liter (μg/L)

TABLE 2 (Continued)

ANALYTICAL RESULTS FOR SEMIVOLATILE ORGANIC COMPOUNDS IN GROUNDWATER

Analyte	Well:	P12A		P14A		P24B		P24C3		P26A		MCL
	Date:	June 1994		June 1994		June 1994		October 1995		June 1994		
	Laboratory:	IDEM	PRP	IDEM	PRP	IDEM	PRP	IDEM	PRP	IDEM	PRP	
Aniline		10 U	NA	100 U	NA	10 U	NA	NA	NA	10 U	NA	--
Benzoic acid		10 U	NA	100 U	NA	10 U	NA	NA	NA	10 U	NA	--
Di-n-butylphthalate		10; 14	10 U	100 U	10 U	10 U	NA	NA	NA	10 U	10 U	--
Bis(2-ethylhexyl)phthalate		68; 130	10 U	390	10 U	63	NA	NA	NA	41	10 U	--
Hexachloroethane		10 U	10 U	100 U	10 U	10 U	NA	NA	NA	10 U	10 U	--
Isophorone		10 U	10 U	100 U	10 U	10 U	NA	NA	NA	10 U	10 U	--
4-Methylphenol		10 U	10 U	100 U	10 U	10 U	NA	NA	NA	10 U	10 U	--
Nitrobenzene		10 U	10 U	720	570	10 U	NA	NA	NA	10 U	10 U	--
Phenol		150; 160	120 J	100 U	10 U	10 U	NA	NA	NA	10 U	10 U	--

Analyte	Well:	P27A		P27C3		P28C1		P29A		P30C1		MCL
	Date:	June 1994		October 1995		June 1994		June 1994		June 1994		
	Laboratory:	IDEM	PRP	IDEM	PRP	IDEM	PRP	IDEM	PRP	IDEM	PRP	
Aniline		10 U	NA	NA	NA	11 U	NA	10 U	NA	10 U	NA	--
Benzoic acid		10 U	NA	NA	NA	11 U	NA	10 U	NA	10 U	NA	--
Di-n-bultyphthalate		10 U	NA	NA	NA	11 U	10 U	10 U	10 U	10 U	10 U	--
Bis(2-ethylhexyl)phthalate		10 U	NA	NA	NA	11 U	10 U	10 U	10 U	13	10 U	--
Hexachloroethane		10 U	NA	NA	NA	11 U	10 U	10 U	10 U	10 U	10 U	--
Isophorone		10 U	NA	NA	NA	11 U	10 U	10 U	10 U	10 U	10 U	--
4-Methylphenol		10 U	NA	NA	NA	11 U	10 U	10 U	10 U	10 U	10 U	--
Nitrobenzene		10 U	NA	NA	NA	11 U	10 U	10 U	10 U	10 U	10 U	--
Phenol		10 U	NA	NA	NA	11 U	10 U	10 U	10 U	10 U	10 U	--

All values are given in micrograms per liter ($\mu g/L$)

TABLE 2 (Continued)

ANALYTICAL RESULTS FOR SEMIVOLATILE ORGANIC COMPOUNDS IN GROUNDWATER

Analyte	Well:	P30C3		P31C1		P31C2		P31C3		P34 *A		MCL
	Date:	October 1995		June 1994		June 1994		April 1995		April 1995		
	Laboratory:	IDEM	PRP	IDEM	PRP	IDEM	PRP	IDEM	PRP	IDEM	PRP	
Aniline		NA	NA	10 U	NA	10 U	NA	10 U	NA	ND	NA	--
Benzoic acid		NA	NA	10 U	NA	10 U	NA	10 U	NA	ND	NA	--
Di-n-butylphthalate		NA	NA	10 U	10 U	10 U	NA	10 U	10 U	ND	NA	--
Bis(2-ethylhexyl)phthalate		NA	NA	130	10 U	10	NA	17 U	10 U	ND	NA	--
Hexachloroethane		NA	NA	10 U	10 U	10 U	NA	10 U	10 U	ND	NA	--
Isophorone		NA	NA	10 U	10 U	10 U	NA	10 U	10 U	ND	NA	--
4-Methylphenol		NA	NA	10 U	10 U	10 U	NA	10 U	10 U	ND	NA	--
Nitrobenzene		NA	NA	10 U	10 U	10 U	NA	10 U	10 U	ND	NA	--
Phenol		NA	NA	10 U	10 U	10 U	NA	10 U	10 U	ND	NA	--

Analyte	Well:	P34C3		P34*C3		MW21L		MW(P)23C1		MW25B		MCL
	Date:	October 1995		October 1995		June 1994		June 1994		June 1994		
	Laboratory:	IDEM	PRP	IDEM	PRP	IDEM	PRP	IDEM	PRP	IDEM	PRP	
Aniline		NA	NA	NA	NA	11 U	NA	10 U	NA	10 U	10 U	--
Benzoic acid		NA	NA	NA	NA	11 U	NA	10 U	NA	10 U	10 U	--
Di-n-bultyphthalate		NA	NA	NA	NA	11 U	10 U	10 U	10 U	10 U	10 U	--
Bis(2-ethylhexyl)phthalate		NA	NA	NA	NA	11 U	10 U	17	10 U	10 U	10 U	--
Hexachloroethane		NA	NA	NA	NA	11 U	10 U	10 U	10 U	10 U	10 U	--
Isophorone		NA	NA	NA	NA	11 U	10 U	10 U	10 U	10 U	10 U	--
4-Methylphenol		NA	NA	NA	NA	11 U	10 U	10 U	10 U	10 U	10 U	--
Nitrobenzene		NA	NA	NA	NA	11 U	10 U	10 U	10 U	10 U	10 U	--
Phenol		NA	NA	NA	NA	11 U	10 U	10 U	10 U	10 U	10 U	--

All values are given in micrograms per liter (μg/L)

TABLE 2 (Continued)

ANALYTICAL RESULTS FOR SEMIVOLATILE ORGANIC COMPOUNDS IN GROUNDWATER

Analyte	Well:	MW28B		MW33B		MCL
	Date:	June 1994		June 1994		
	Laboratory:	IDEM	PRP	IDEM	PRP	
Aniline		10 U	10 U	10 U	10 U	--
Benzoic acid		10 U	10 U	10 U	10 U	--
Di-n-butylphthalate		10 U	10 U	10 U	10 U	--
Bis(2-ethylhexyl)phthalate		10 U	10 U	10	10 U	--
Hexachloroethane		10 U	10 U	10 U	10 U	--
Isophorone		10 U	10 U	10 U	10 U	--
4-Methylphenol		10 U	10 U	10 U	10 U	--
Nitrobenzene		10 U	10 U	10 U	10 U	--
Phenol		10 U	10 U	10 U	10 U	--

Notes:

IDEM = Indiana Department of Environmental Management
PRP = Potentially responsible party
MCL = Maximum Contaminant Level; "--" if no MCL exists
U = Analyte sought but not found; associated number is reporting limit
J = Result estimated for quality control reasons
ND = Analyte sought but not found; no reporting limit available
NA = Either sample was not analyzed or results are not available
Two numbers in an entry are for field duplicate samples with different results.
Di-n-butylphthalate and bis(2-ethylhexyl)phthalate are common laboratory contaminants; positive results for these chemicals may be artifacts

All values are given in micrograms per liter (μg/L)

TABLE 3

ANALYTICAL RESULTS FOR INDICATOR PARAMETERS IN GROUNDWATER

	Well:	P1A		P2A		P2B		P4B		P5B		
	Date:	June 1994		June 1994		June 1994		June 1994		June 1994		
Analyte	Laboratory:	IDEM	PRP	IDEM	PRP	IDEM	PRP	IDEM	PRP	IDEM	PRP	MCL
Alkalinity		590	560	430; 420	380 J; 1,900 J	450	450	1,000	970	500	620	--
Chloride		4.5	6.4	640; 18	650 J; 620 J	10	7.9	31	36	10 U	6.1	--
Cyanide		0.005 U	0.01 UJ	0.005 U	0.31 J; 0.52 J	0.005 U	0.02	0.005 U	0.01 U	0.005 U	0.01 U	200
Nitrogen as ammonia		0.14	0.12 U	10	11	1.4	1.1	0.1 U	0.12 U	0.1 U	0.12 U	1,000
Nitrogen as nitrate		0.1 U	0.01 U	0.1 U	0.37 J	0.1 U	0.01 U	0.1 U	0.10	0.1 U	0.01 U	10,000
Sulfate		95	110	5.0 U	5.0 U	38	52	210	210	100	91	--

	Well:	P5C2		P7B		P8C1		P8C3		P10 (D2I)		
	Date:	April 1995		June 1994		June 1994		October 1995		June 1994		
Analyte	Laboratory:	IDEM	PRP	IDEM	PRP	IDEM	PRP	IDEM	PRP	IDEM	PRP	MCL
Alkalinity		NA	NA	400	400 J	400	420	NA	NA	NA	NA	--
Chloride		NA	NA	400	380	41	42	NA	NA	NA	NA	--
Cyanide		NA	NA	0.005 U	0.01 U	0.005 U	0.04	NA	NA	NA	NA	200
Nitrogen as ammonia		NA	NA	0.1 U	0.12 U	0.14 U	0.12 U	NA	NA	NA	NA	1,000
Nitrogen as nitrate		NA	NA	0.1 U	0.06	0.1 U	0.01 U	NA	NA	NA	NA	10,000
Sulfate		NA	NA	93	100	24	42	NA	NA	NA	NA	--

All values are given in milligrams per liter (mg/L)

TABLE 3 (Continued)

ANALYTICAL RESULTS FOR INDICATOR PARAMETERS IN GROUNDWATER

	Well:	P12A		P14A		P24B		P24C3		P26A		
	Date:	June 1994		June 1994		June 1994		October 1995		June 1994		
Analyte	Laboratory:	IDEM	PRP	IDEM	PRP	IDEM	PRP	IDEM	PRP	IDEM	PRP	MCL
Alkalinity		610; 340	680	720	720	330	NA	NA	NA	NA	NA	--
Chloride		340	1.0 U	650	99	2.0 U	NA	NA	NA	NA	NA	--
Cyanide		NA	0.01 U	0.005 U	0.79	0.005 U	NA	NA	NA	0.005 U	0.02	200
Nitrogen as ammonia		1.3; 1.5	1.4	0.57	0.59	0.14	NA	NA	NA	NA	NA	1,000
Nitrogen as nitrate		0.1 U	0.01 U	0.01 U	0.45 UJ	0.10 U	NA	NA	NA	NA	NA	10,000
Sulfate		43; 41	55	41	70	56	NA	NA	NA	NA	NA	--

	Well:	P27A		P27C3		P28C1		P29A		P30C1		
	Date:	June 1994		October 1995		June 1994		June 1994		June 1994		
Analyte	Laboratory:	IDEM	PRP	IDEM	PRP	IDEM	PRP	IDEM	PRP	IDEM	PRP	MCL
Alkalinity		520	NA	NA	NA	320	340 J	800	780	350	350	--
Chloride		33	NA	NA	NA	2.0 U	1.7	87	98	3.3	3.9	--
Cyanide		0.005 U	NA	NA	NA	0.005 U	0.01 U	0.005 U	0.01 U	0.005 U	0.01 U	200
Nitrogen as ammonia		0.10 U	NA	NA	NA	0.1 U	0.12 U	0.1 U	0.12 U	0.1 U	0.12 U	1,000
Nitrogen as nitrate		0.80	NA	NA	NA	0.1 U	0.09	0.1 U	0.01 U	0.1 U	0.01 U	10,000
Sulfate		210	NA	NA	NA	66	54	190	170	34	66	--

All values are given in milligrams per liter (mg/L)

TABLE 3 (Continued)

ANALYTICAL RESULTS FOR INDICATOR PARAMETERS IN GROUNDWATER

Analyte	Well:	P30C3		P31C1		P31C2		P31C3		P34*A		MCL
	Date:	October 1995		June 1994		June 1994		April 1995		April 1995		
	Laboratory:	IDEM	PRP	IDEM	PRP	IDEM	PRP	IDEM	PRP	IDEM	PRP	
Alkalinity		NA	NA	370	370	630	370	340	340	ND	NA	--
Chloride		NA	NA	88	17 J	16	15	7.8	8.8	ND	NA	--
Cyanide		NA	NA	0.005 U	0.01 U	0.005 U	0.01 U	NA	0.005 U	ND	NA	200
Nitrogen as ammonia		NA	NA	0.12	0.12 U	0.19	0.17 R	0.15	0.21	ND	NA	1,000
Nitrogen as nitrate		NA	NA	0.10 U	0.02	0.10 U	0.04	NA	0.15	ND	NA	10,000
Sulfate		NA	NA	52	57	52	58	47	58	ND	NA	--

Analyte	Well:	P34C3		P34*C3		MW21L		MW(P)23C1		MW25B		MCL
	Date:	October 1995		October 1995		June 1994		June 1994		June 1994		
	Laboratory:	IDEM	PRP	IDEM	PRP	IDEM	PRP	IDEM	PRP	IDEM	PRP	
Alkalinity		NA	NA	NA	NA	300	330	340	370	410	410	--
Chloride		NA	NA	NA	NA	2.0 U	2.4	2.0 U	2.8	2.7	3.4	--
Cyanide		NA	NA	NA	NA	0.005 U	0.01 U	0.005 U	0.01 U	0.005 U	0.01 U	200
Nitrogen as ammonia		NA	NA	NA	NA	0.25	0.15 R	0.1 U	0.12 U	0.1 U	0.12 U	1,000
Nitrogen as nitrate		NA	NA	NA	NA	0.1 U	0.01 U	0.1 UJ	0.01 U	0.1 U	0.03 J	10,000
Sulfate		NA	NA	NA	NA	51	42	69	58	65	68	--

All values are given in milligrams per liter (mg/L)

TABLE 3 (Continued)

ANALYTICAL RESULTS FOR INDICATOR PARAMETERS IN GROUNDWATER

	Well:	MW28B		MW33B		
	Date:	June 1994		June 1994		
Analyte	Laboratory:	IDEM	PRP	IDEM	PRP	MCL
Alkalinity		510	490	439	410	--
Chloride		23	25	6.5	7.4	--
Cyanide		0.005 U	0.01 U	0.005 U	0.08 U	200
Nitrogen as ammonia		0.1 U	0.12 U	0.28	0.21 R	1,000
Nitrogen as nitrate		0.1 U	0.18 J	0.1 U	0.01 U	10,000
Sulfate		67	54	100	110	--

Notes:

IDEM = Indiana Department of Environmental Management
PRP = Potentially responsible party
MCL = Maximum Contaminant Level; "--" if no MCL exists
U = Analyte sought but not found; associated number is reporting limit
J = Result estimated for quality control reasons
ND = Analyte sought but not found; no reporting limit available
NA = Either sample was not analyzed or value not available
Two numbers in an entry are for field duplicate samples with different results.

All values are given in milligrams per liter (mg/L)

TABLE 4

ANALYTICAL RESULTS FOR TOTAL METALS IN GROUNDWATER

	Well:	P1A		P2A		P2B		P4B		P5B		
	Date:	June 1994		June 1994		June 1994		June 1994		June 1994		
Analyte	Laboratory:	IDEM	PRP	IDEM	PRP	IDEM	PRP	IDEM	PRP	IDEM	PRP	MCL
Aluminum		110,000	80,000	880; 1,400	89 J; 120 J	1,200	420	64,000	57,000	55,000	50 U	--
Antimony		300 U	60 U	300 U	30 U	60 U	30 U	600 U	30 U	300 U	30 U	6
Arsenic		62	56	16; 19	18	20	22	120	76	67	68	50
Barium		390	300	840; 780	810; 780	170	170	440	140	370	2 U	2,000
Beryllium		25 U	5 U	25 U	5 U	5 U	5 U	25 U	5 U	25 U	5 U	4
Cadmium		25 U	50 U	25 U	5 U	5 U	5 U	25 U	50 U	25 U	5 U	5
Calcium		740,000	640,000	400,000; 340,000	380,000; 370,000	100,000	100,000	860,000	840,000	850,000	970,000	--
Chromium		250	140	5.0 U	12 J; 21 J	10 U	10 U	230	150	120	130	100
Cobalt		250 U	89	250 U	10 U	50 U	10 U	250 U	63	250 U	70	--
Copper		50 U	110	50 U	20 U	10 U	20 U	50 U	150	50 U	180	1,300
Iron		200,000	170,000	80,000; 76,000	75,000; 73,000	4,000	2,700	160,000	170,000	140,000	59 R	--
Lead		140	120	20 U	30 UJ; 83 J	20 U	3 U	250 U	110	57	140	15
Magnesium		360,000	300,000	62,000; 58,000	63,000; 61,000	49,000	50,000	370,000	390,000	330,000	430,000	--
Manganese		5,000	4,400	640; 650	680; 670	90	65	5,000	4,900	5,300	5,800	--
Mercury		0.5 U	0.5 U	0.5 U	0.2 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.2 U	2
Nickel		360	220	50 U	11 J; 21 J	10 U	10 U	250	170	110	160	100
Potassium		31,000	25,000	5,000 U	1,600	3,900	2,800	19,000 U	17,000	17,000	15,000	--
Selenium		11	5 U	5 U	5 U	10 U	5 U	250 U	5 U	10 U	5 U	50
Silver		50 U	130	50 U	10 U	10 U	10 U	50 U	10 U	50 U	10 U	--
Sodium		12,000	11,000	7,100; 7,800	7,800	8,400	8,800	64,000	67,000	5,900	5,300	--
Thallium		10 U	10 U	10 U	10 U	200 U	10 U	100 U	10 U	100 U	10 U	2
Vanadium		360	130	25 U	10 U	50 U	10 U	330	110	280	120	--
Zinc		120	610	100 U	45 R; 71 R	20 U	20 U	100	540	320	580	--

All values are given in micrograms per liter (μg/L)

TABLE 4 (Continued)

ANALYTICAL RESULTS FOR TOTAL METALS IN GROUNDWATER

	Well:	P5C2		P7B		P8C1		P8C3		P10 (D2I)		
	Date:	April 1995		June 1994		June 1994		October 1995		June 1994		
Analyte	Laboratory:	IDEM	PRP	IDEM	PRP	IDEM	PRP	IDEM	PRP	IDEM	PRP	MCL
Aluminum		NA	NA	22,000	24,000	1,200	50 U	ND	NA	33,000	19,000 J	--
Antimony		NA	NA	140	30 U	60 U	30 U	NA	NA	120 U	30 U	6
Arsenic		NA	NA	18	26	5 U	5 U	ND	NA	33	20	50
Barium		NA	NA	230	250	60	50	NA	NA	330	250	2,000
Beryllium		NA	NA	10 U	5 U	5 U	5 U	NA	NA	10 U	5 U	4
Cadmium		NA	NA	10 U	5 U	5 U	5 U	NA	NA	10 U	5 U	5
Calcium		NA	NA	340,000	400,000	120,000	120,000	NA	NA	400,000	300,000	--
Chromium		NA	NA	70	50	10 U	10 U	ND	NA	90	60	100
Cobalt		NA	NA	50 U	23	50 U	10 U	NA	NA	100 U	23	--
Copper		NA	NA	10 U	62	10 U	20 U	ND	NA	60	100	1,300
Iron		NA	NA	42,000	57,000	5,300	3,500	NA	NA	73,000	47,000	--
Lead		NA	NA	5 U	44	20 U	3 U	ND	NA	53	35	15
Magnesium		NA	NA	150,000	200,000	40,000	41,000	NA	NA	130,000	96,000	--
Manganese		NA	NA	1,300	1,800	350	380	NA	NA	5,200	4,800	--
Mercury		NA	NA	0.5 U	0.2 U	0.5 U	0.2 U	NA	NA	0.5 U	0.5 U	2
Nickel		NA	NA	80	67	20	10 U	ND	NA	150	82	100
Potassium		NA	NA	12,000	10,000	1,900	1,900	NA	NA	12,000	9,800	--
Selenium		NA	NA	20 U	5 U	10 U	5 U	NA	NA	10 U	5 U	50
Silver		NA	NA	10 U	10 U	10 U	10 U	NA	NA	20 U	10 U	--
Sodium		NA	NA	100,000	110,000	12,000	12,000	NA	NA	15,000	17,000 J	--
Thallium		NA	NA	500 U	10 U	100 U	10 U	NA	NA	10 U	10 U	2
Vanadium		NA	NA	140	51	50 U	10 U	NA	NA	150	43	--
Zinc		NA	NA	30	230	20 U	20 U	NA	NA	140	240	--

All values are given in micrograms per liter (μg/L)

TABLE 4 (Continued)

ANALYTICAL RESULTS FOR TOTAL METALS IN GROUNDWATER

Analyte	Well:	P12A		P14A		P24B		P24C3		P26A		MCL
	Date:	June 1994		June 1994		June 1994		October 1995		June 1994		
	Laboratory:	IDEM	PRP	IDEM	PRP	IDEM	PRP	IDEM	PRP	IDEM	PRP	
Aluminum		47,000; 45,000	14,000	54,000	50,000	17,000	NA	302,000	NA	140,000	41,000 J	--
Antimony		300 U	30 U	300 U	600 U	60 U	NA	NA	NA	300 U	30 U	6
Arsenic		37; 32	31	56	77	20	NA	ND	NA	86	40	50
Barium		640; 590	590	430	360	150	NA	NA	NA	570	270	2,000
Beryllium		25 U	5 U	25 U	5 U	5 U	NA	NA	NA	25 U	5 U	4
Cadmium		25 U	5 U	25 U	5 U	5 U	NA	NA	NA	25 U	5 U	5
Calcium		470,000; 430,000	430,000	680,000	620,000	150,000	NA	NA	NA	720,000	340,000	--
Chromium		140; 120	80	110	100	70	NA	ND	NA	250 U	90	100
Cobalt		250 U; 100	91	250 U	62	50 U	NA	NA	NA	250 U	53	--
Copper		50 U	110	50 U	120	10 U	NA	ND	NA	110	110	1,300
Iron		96,000; 84,000	81,000	130,000	120,000	28,000	NA	NA	NA	240,000	91,000	--
Lead		20 U; 54	130	23	96	31	NA	ND	NA	20 U	110	15
Magnesium		170,000; 160,000	160,000	230,000	220,000	68,000	NA	NA	NA	320,000	140,000	--
Manganese		7,300; 6,200	7,600	6,300	5,600	590	NA	NA	NA	6,800	3,900	--
Mercury		0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	NA	NA	NA	0.5 U	0.5 U	2
Nickel		290; 280	250	200	150	80	NA	ND	NA	360	130	100
Potassium		53,000; 51,000	43,000	28,000	24,000	8,200	NA	NA	NA	53,000	14,000	--
Selenium		10 U	5 U	5 U	5 U	5 U	NA	NA	NA	10 U	5.6	50
Silver		50 U	10 U	50 U	10 U	10 U	NA	NA	NA	50 U	10 U	--
Sodium		39,000;38,000	40,000 J	33,000	27,000	5,800	NA	NA	NA	41,000	43,000 J	--
Thallium		10 U	10 U	10 U	10 U	10 U	NA	NA	NA	10 U	10 U	2
Vanadium		250 U	72	260	110	70	NA	NA	NA	500	83	--
Zinc		160; 100 U	430	25 U	59	90	NA	ND	NA	550	340	--

All values are given in micrograms per liter (μg/L)

TABLE 4 (Continued)

ANALYTICAL RESULTS FOR TOTAL METALS IN GROUNDWATER

	Well:	P27A		P27C3		P28C1		P29A		P30C1		
	Date:	June 1994		October 1995		June 1994		June 1994		June 1994		
Analyte	Laboratory:	IDEM	PRP	IDEM	PRP	IDEM	PRP	IDEM	PRP	IDEM	PRP	MCL
Aluminum		1,900	NA	ND	NA	3,200	50 U	17,000	20,000	380	50 U	--
Antimony		100 U	NA	NA	NA	60 U	30 U	120 U	30 U	60 U	30 U	6
Arsenic		5 U	NA	ND	NA	5 U	5 U	22	23	5 U	5 U	50
Barium		50	NA	NA	NA	60	41	310	360	40	37	2,000
Beryllium		3 U	NA	NA	NA	5 U	5 U	10 U	5 U	5 U	5 U	4
Cadmium		5 U	NA	NA	NA	5 U	5 U	10 U	5 U	5 U	5 U	5
Calcium		170,000	NA	NA	NA	170,000	89,000	300,000	320,000	88,000	89,000	--
Chromium		30	NA	ND	NA	40	33	50	41	10 U	10 U	100
Cobalt		20 U	NA	NA	NA	50 U	10	100 U	27	50 U	10 U	--
Copper		20 U	NA	ND	NA	10 U	20	20 U	34	10 U	20 U	1,300
Iron		2,200	NA	NA	NA	9,800	160 R	34,000	44,000	1,200	890	--
Lead		5 U	NA	ND	NA	20 U	34	5 U	24	20 U	3 U	15
Magnesium		79,000	NA	NA	NA	80,000	44,000	120,000	130,000	38,000	38,000	--
Manganese		90	NA	NA	NA	730	290	1,300	1,500	50	61	--
Mercury		0.5 U	NA	NA	NA	0.5 U	0.2 U	0.5 U	0.2 U	0.5 U	0.2 U	2
Nickel		30	NA	ND	NA	40	29R	80	65	10 U	10 U	100
Potassium		1,900	NA	NA	NA	1,600	1,400	9,800	9,800	1,000	890	--
Selenium		10 U	NA	NA	NA	10 U	5 U	20 U	5 U	16	5 U	50
Silver		10 U	NA	NA	NA	10 U	10 U	20 U	10 U	10 U	10 U	--
Sodium		14,000	NA	NA	NA	6,900	6,800	51,000	55,000	4,100	3,600	--
Thallium		5 U	NA	NA	NA	100 U	10 U	500 U	10 U	100 U	10 U	2
Vanadium		20 U	NA	NA	NA	50 U	10 U	120	43	50 U	10 U	--
Zinc		20 U	NA	NA	NA	20 U	140 R	40 U	170 R	20 U	20 U	--

All values are given in micrograms per liter (μg/L)

TABLE 4 (Continued)

ANALYTICAL RESULTS FOR TOTAL METALS IN GROUNDWATER

Analyte	Well:	P30C3		P31C1		P31C2		P31C3		P34 *A		MCL
	Date:	October 1995		June 1994		June 1994		April 1995		April 1995		
	Laboratory:	IDEM	PRP	IDEM	PRP	IDEM	PRP	IDEM	PRP	IDEM	PRP	
Aluminum		ND	NA	130	64	240	180	360	120	NA	NA	--
Antimony		NA	NA	60 U	30 U	60 U	30 U	100 U	30 U	NA	NA	6
Arsenic		ND	NA	5 U	5 U	10	5 U	8	10	NA	NA	50
Barium		NA	NA	70	60	120	110	140	120	NA	NA	2,000
Beryllium		NA	NA	5 U	5 U	5 U	5 U	5 U	5 U	NA	NA	4
Cadmium		NA	NA	5 U	5 U	5 U	5 U	5 U	5 U	NA	NA	5
Calcium		NA	NA	96,000	96,000	86,000	94,000	110,000	96,000	NA	NA	--
Chromium		ND	NA	10 U	10 U	10 U	10 U	10 U	10 U	NA	NA	100
Cobalt		NA	NA	50 U	10 U	50 U	10 U	20 U	10 U	NA	NA	--
Copper		ND	NA	10 U	20 U	10 U	20 U	20 U	20 U	NA	NA	1,300
Iron		NA	NA	1,500	700	2,700	2,700	3,300	3,300	NA	NA	--
Lead		ND	NA	20 U	3 U	20 U	3 U	5 U	3 U	NA	NA	15
Magnesium		NA	NA	34,000	35,000	34,000	35,000	35,000	31,000	NA	NA	--
Manganese		NA	NA	70	47	60	65	60	58	NA	NA	--
Mercury		NA	NA	0.5 U	0.2 U	0.5 U	0.5 U	0.5 U	0.2 U	NA	NA	2
Nickel		ND	NA	10 U	10 U	20	10 U	10	10 U	NA	NA	100
Potassium		NA	NA	2,500	2,800	1,000 U	1,600	1,800	1,000	NA	NA	--
Selenium		NA	NA	5 U	5 U	10 U	5 U	10 U	5 U	NA	NA	50
Silver		NA	NA	10 U	10 U	10 U	10 U	10 U	10 U	NA	NA	--
Sodium		NA	NA	8,800	9,100	6,500	7,000	6,700	5,400	NA	NA	--
Thallium		NA	NA	10 U	10 U	10 U	10 U	5 U	10 U	NA	NA	2
Vanadium		NA	NA	50 U	10 U	50 U	10 U	20 U	10 U	NA	NA	--
Zinc		NA	NA	20 U	21 R	20 U	25 R	20 U	20 U	NA	NA	--

All values are given in micrograms per liter (μg/L)

TABLE 4 (Continued)

ANALYTICAL RESULTS FOR TOTAL METALS IN GROUNDWATER

	Well:	P34C3		P34*C3		MW21L		MW(P)23C1		MW25B		
	Date:	October 1995		October 1995		June 1994		June 1994		June 1994		
Analyte	Laboratory:	IDEM	PRP	IDEM	PRP	IDEM	PRP	IDEM	PRP	IDEM	PRP	MCL
Aluminum		482,000	NA	4,950,000	NA	1,700	1,100	520	370	1,900	50 U	--
Antimony		NA	NA	NA	NA	60 U	30 U	60 U	30 U	60 U	30 U	6
Arsenic		ND	NA	11,400	NA	10 U	6.2	10 U	5 U	5 U	29	50
Barium		NA	NA	NA	NA	150	160	40	49	50	160	2,000
Beryllium		NA	NA	NA	NA	5 U	5 U	5 U	5 U	5 U	5 U	4
Cadmium		NA	NA	NA	NA	5 U	5 U	5 U	5 U	5 U	5 U	5
Calcium		NA	NA	NA	NA	76,000	84,000	86,000	92,000	1,000 U	320,000	--
Chromium		ND	NA	24,400	NA	20	18	10 U	10 U	10 U	230	100
Cobalt		NA	NA	NA	NA	50 U	10 U	50 U	10 U	20 U	32	--
Copper		ND	NA	ND	NA	10 U	20 U	10 U	20 U	20 U	50	1,300
Iron		NA	NA	76,900	NA	3,200	3,100	1,700	1,900	100 U	68,000	--
Lead		ND	NA	26,500	NA	5 U	3 U	5 U	3 U	250 U	64	15
Magnesium		NA	NA	ND	NA	29,000	31,000	35,000	38,000	1,000 U	190,000	--
Manganese		NA	NA	NA	NA	120	130	60	74	10 U	2,100	--
Mercury		NA	NA	NA	NA	0.5 U	0.2 U	0.5 U	0.5 U	0.5 U	0.5 U	2
Nickel		ND	NA	ND	NA	20	21	10 U	11	10 U	170	100
Potassium		NA	NA	41,200	NA	1,800	1,600	2,000	1,300	1,000 U	11,000	--
Selenium		NA	NA	NA	NA	20 U	5 U	20 U	5 U	250 U	5 U	50
Silver		NA	NA	NA	NA	10 U	10 U	10 U	10 U	40 U	10 U	--
Sodium		NA	NA	NA	NA	5,300	5,800	3,200	3,600	1,000 U	6,500	--
Thallium		NA	NA	NA	NA	500 U	10 U	500 U	10 U	100 U	10 U	2
Vanadium		NA	NA	NA	NA	50 U	10 U	50 U	10 U	50 U	55	--
Zinc		68,300	NA	ND	NA	50	84	20 U	37	20 U	29 J	--

All values are given in micrograms per liter (μg/L)

TABLE 4 (Continued)

ANALYTICAL RESULTS FOR TOTAL METALS IN GROUNDWATER

Analyte	Well:	MW28B		MW33B		MCL
	Date:	June 1994		June 1994		
	Laboratory:	IDEM	PRP	IDEM	PRP	
Aluminum		77,000	46,000	14,000	18,000 J	--
Antimony		120 U	30 U	120 U	30 U	6
Arsenic		37	32	24	20	50
Barium		250	190	110	170	2,000
Beryllium		10 U	5.9	10 U	5 U	4
Cadmium		5 U	5 U	10 U	13	5
Calcium		390,000	380,000	210,000	350,000	--
Chromium		150	10 U	90	120	100
Cobalt		10 U	49	100 U	10 U	--
Copper		20 U	80	20 U	20 U	1,300
Iron		120,000	96,000	34,000	52,000	--
Lead		8	76	47	43	15
Magnesium		180,000	180,000	96,000	160,000	--
Manganese		2,500	250 U	1,200	2,200	--
Mercury		0.5 U	0.2 U	0.5 U	0.5 U	2
Nickel		200	130	120	100	--
Potassium		29000	15,000	5,300	6,800	--
Selenium		20 U	5 U	10 U	5 U	50
Silver		20 U	10 U	50 U	10 U	--
Sodium		12,000	12,000	2,500	4,300 J	--
Thallium		500 U	10 U	10 U	10 U	2
Vanadium		210	78	10 U	41	--
Zinc		260	42	40 U	240	--

All values are given in micrograms per liter (μg/L)

TABLE 4 (Continued)

ANALYTICAL RESULTS FOR TOTAL METALS IN GROUNDWATER

Notes:

IDEM	=	Indiana Department of Environmental Management
PRP	=	Potentially responsible party
MCL	=	Maximum Contaminant Level; values for copper and lead are action levels; "--" if no MCL exists
U	=	Analyte sought but not found; associated number is reporting limit
J	=	Result estimated for quality control reasons
ND	=	Analyte sought but not found; no reporting limit available
NA	=	Either sample was not analyzed or value not available

Two numbers in an entry are for field duplicate samples with different results.

All values are given in micrograms per liter (μg/L)

TABLE 5 (Continued)

ANALYTICAL RESULTS FOR DISSOLVED METALS IN GROUNDWATER

Analyte	Well:	P5C2		P7B		P8C1		P8C3		P10 (D2I)		MCL
	Date:	April 1995		June 1994		June 1994		October 1995		June 1994		
	Laboratory:	IDEM	PRP	IDEM	PRP	IDEM	PRP	IDEM	PRP	IDEM	PRP	
Aluminum		NA	NA	60	50 U	50	50 U	ND	NA	120	50 UJ	--
Antimony		NA	NA	60 U	30 U	60 U	30 U	NA	NA	60 U	30 U	6
Arsenic		NA	NA	5 U	5 U	5 U	5 U	ND	NA	5 U	5 U	50
Barium		NA	NA	60	175	40	48 R	NA	NA	110	120	2,000
Beryllium		NA	NA	5 U	5 U	5 U	5 U	NA	NA	5 U	5 U	4
Cadmium		NA	NA	5 U	5 U	5 U	5 U	NA	NA	5 U	5 U	5
Calcium		NA	NA	100,000	130,000	95,000	110,000	NA	NA	150,000	170,000	--
Chromium		NA	NA	10 U	10 U	10 U	10 U	ND	NA	10 U	10 U	100
Cobalt		NA	NA	50 U	10 U	50 U	10 U	NA	NA	5 U	10 U	--
Copper		NA	NA	10 U	20 U	10 U	20 U	ND	NA	10 U	20 U	1,300
Iron		NA	NA	120	160	2,900	3,500	NA	NA	240	25 U	--
Lead		NA	NA	20 U	3 U	20 U	3 U	ND	NA	10 U	3 U	15
Magnesium		NA	NA	58,000	74,000	34,000	40,000	NA	NA	36,000	42,000	--
Manganese		NA	NA	90	140	280	360	NA	NA	3,300	3,900	--
Mercury		NA	NA	0.5 U	0.5 U	0.5 U	0.5 U	NA	NA	0.5 U	0.5 U	2
Nickel		NA	NA	10	10 U	10 U	10 U	ND	NA	40	19 R	100
Potassium		NA	NA	1,600	2,300	1,600	1,900	NA	NA	3,900	5,100	--
Selenium		NA	NA	20 U	5 U	5 U	6 U	NA	NA	5 U	5 U	50
Silver		NA	NA	10 U	10 U	10 U	10 U	NA	NA	10 U	10 U	--
Sodium		NA	NA	82,000	110,000	11,000	12,000	NA	NA	13,000	17,000	--
Thallium		NA	NA	500 U	10 U	100 U	16 U	NA	NA	10 U	10 U	2
Vanadium		NA	NA	50 U	10 U	50 U	10 U	NA	NA	50 U	10 U	--
Zinc		NA	NA	20 U	20 U	20 U	20 U	NA	NA	20 U	20 U	--

All values are given in micrograms per liter (μg/L)

TABLE 5 (Continued)

ANALYTICAL RESULTS FOR DISSOLVED METALS IN GROUNDWATER

Analyte	Well:	P12A		P14A		P24B		P24C3		P26A		MCL
	Date:	June 1994		June 1994		June 1994		October 1995		June 1994		
	Laboratory:	IDEM	PRP	IDEM	PRP	IDEM	PRP	IDEM	PRP	IDEM	PRP	
Aluminum		100; 320	50 UJ	150	100 U	100 U	NA	ND	NA	360	50 UJ	--
Antimony		60 U	30 U	60 U	30 U	60 U	NA	NA	NA	60 U	30 U	6
Arsenic		8; 7	6.2	7	8.1	8	NA	ND	NA	10 U	5 U	50
Barium		350; 360	360	150	130	90	NA	NA	NA	80	73	2,000
Beryllium		5 U	5 U	5 U	5 U	5 U	NA	NA	NA	5 U	5 U	4
Cadmium		5 U	5 U	5 U	5 U	5 U	NA	NA	NA	5 U	5 U	5
Calcium		190,000	220,000	170,000	180,000	87,000	NA	NA	NA	130,000	140,000	--
Chromium		10 U	10 U	10 U	10 U	10 U	NA	ND	NA	10 U	10 U	100
Cobalt		50 U	21	50 U	10 U	50 U	NA	NA	NA	50 U	10 U	--
Copper		10 U	20 U	10 U	20 U	10 U	NA	ND	NA	10 U	20 U	1,300
Iron		5,000; 5,400	1,800	1,200	1,200	450	NA	NA	NA	470	25 U	--
Lead		10 U	3 U	5 U	5 U	5 U	NA	ND	NA	100 U	3 U	15
Magnesium		58,000	66,000	44,000	45,000	34,000	NA	NA	NA	33,000	38,000	--
Manganese		1,600	1,800	2,600	2,800	40	NA	NA	NA	710	800	--
Mercury		0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	NA	NA	NA	0.5 U	0.5 U	2
Nickel		80	70 R	10 U	10 U	10 U	NA	ND	NA	10 U	10 U	100
Potassium		36,000	39,000	10,000	11,000	2,600	NA	NA	NA	3,700	3,600	--
Selenium		5 U	5 U	5 U	5 U	5 U	NA	NA	NA	10 U	5 U	50
Silver		10 U	10 U	10 U	10 U	10 U	NA	NA	NA	10 U	10 U	--
Sodium		37,000; 38,000	40,000	28,000	27,000	5,900	NA	NA	NA	42,000	49,000	--
Thallium		10 U	10 U	10 U	10 U	100 U	NA	NA	NA	10 U	10 U	2
Vanadium		50 U	10 U	50 U	10 U	50 U	NA	NA	NA	50 U	10 U	--
Zinc		20 U	28 R	20 U	28	20 U	NA	NA	NA	20 U	20 U	--

All values are given in micrograms per liter (μg/L)

TABLE 5 (Continued)

ANALYTICAL RESULTS FOR DISSOLVED METALS IN GROUNDWATER

Analyte	Well:	P27A		P27C3		P28C1		P29A		P30C1		MCL
	Date:	June 1994		October 1995		June 1994		June 1994		June 1994		
	Laboratory:	IDEM	PRP2	IDEM	PRP	IDEM	PRP	IDEM	PRP	IDEM	PRP	
Aluminum		130	NA	ND	NA	100 U	50 U	60	50 U	230	50 U	--
Antimony		100 U	ND	NA	NA	60 U	30 U	60 U	30 U	60 U	30 U	6
Arsenic		5 U	ND	ND	NA	5 U	5 U	8	9.9	5 U	5 U	50
Barium		50	28	NA	NA	30	29 R	170	23	40	64	2,000
Beryllium		3 U	NA	NA	NA	5 U	5 U	5 U	5 U	5 U	5 U	4
Cadmium		5 U	NA	NA	NA	5 U	5 U	5 U	5 U	5 U	8 U	5
Calcium		170,000	140,000	NA	NA	72,000	74,000	160,000	200,000	88,000	100,000	--
Chromium		10 U	ND	ND	NA	10 U	10 U	10 U	10 U	10 U	10 U	100
Cobalt		20 U	NA	NA	NA	50 U	10 U	50 U	15	50 U	10 U	--
Copper		20 U	ND	ND	NA	10 U	20 U	10 U	20 U	10 U	20 U	1,300
Iron		NA	ND	NA	NA	10 U	46 R	3,200	6,400	920	540	--
Lead		5 U	ND	ND	NA	20 U	3 U	20 U	3 U	20 U	3 U	15
Magnesium		75,000	67,000	NA	NA	36,000	38,000	69,000	87,000	37,000	38,000	--
Manganese		NA	ND	NA	NA	140	190	610	840	50	56	--
Mercury		0.5 U	NA	NA	NA	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2
Nickel		10 U	ND	ND	NA	10 U	10 U	10 U	22	10 U	10 U	100
Potassium		110 U	890	NA	NA	1,200	1,200	2,400	3,400	1,100	890	--
Selenium		10 U	ND	NA	NA	5 U	6 U	20 U	5 U	5 U	6 U	50
Silver		10 U	NA	NA	NA	10 U	10 U	10 U	10 U	10 U	10 U	--
Sodium		13,000	14,000	NA	NA	7,200	6,800	42,000	55,000	4,000	3,600	--
Thallium		5 U	NA	NA	NA	100 U	10 U	500 U	10 U	100 U	16 U	2
Vanadium		20 U	ND	NA	NA	50 U	10 U	50 U	10 U	50 U	10 U	--
Zinc		20 U	ND	NA	NA	20 U	56	20 U	36	20 U	20 U	--

All values are given in micrograms per liter (μg/L)

TABLE 5 (Continued)

ANALYTICAL RESULTS FOR DISSOLVED METALS IN GROUNDWATER

	Well:	P30C3		P31C1		P31C2		P31C3		P34 *A		
	Date:	October 1995		June 1994		June 1994		April 1995		April 1995		
Analyte	Laboratory:	IDEM	PRP	IDEM	PRP	IDEM	PRP	IDEM	PRP	IDEM	PRP	MCL
Aluminum		ND	NA	680	50 U	100 U	50 U	100 U	50 U	NA	NA	--
Antimony		NA	NA	60 U	30 U	60 U	30 U	100 U	30 U	NA	NA	6
Arsenic		ND	NA	5 U	5 U	7	5 U	7	9.3	NA	NA	50
Barium		NA	NA	70	64	110	110	120	120	NA	NA	2,000
Beryllium		NA	NA	5 U	5 U	5 U	5 U	5 U	5 U	NA	NA	4
Cadmium		NA	NA	5 U	5 U	5 U	5 U	5 U	5 U	NA	NA	5
Calcium		NA	NA	88,000	100,000	86,000	94,000	110,000	92,000	NA	NA	--
Chromium		ND	NA	10 U	10 U	10 U	10 U	10 U	10 U	NA	NA	100
Cobalt		NA	NA	50 U	10 U	50 U	10 U	20 U	10 U	NA	NA	--
Copper		ND	NA	10	20 U	10 U	20 U	20 U	20 U	NA	NA	1,300
Iron		NA	NA	420	[illegible]10	1,400	1,800	2,600	2,500	NA	NA	--
Lead		ND	NA	5 U	[illegible]	10 U	3 U	5 U	3 U	NA	NA	15
Magnesium		NA	NA	31,000	37,000	34,000	35,000	3,400 U	30,000	NA	NA	--
Manganese		NA	NA	40 U	43	60	64	50	48	NA	NA	--
Mercury		NA	NA	0.5 U	0.2 U	0.5 U	0.5 U	0.5 U	0.2 U	NA	NA	2
Nickel		ND	NA	10 U	10 U	10 U	10 U	10 U	10 U	NA	NA	100
Potassium		NA	NA	1,800	2,900	1,000 U	1,500	1,500	1,000	NA	NA	--
Selenium		NA	NA	5 U	5 U	5 U	5 U	10 U	5 U	NA	NA	50
Silver		NA	NA	10 U	10 U	10 U	10 U	10 U	10 U	NA	NA	--
Sodium		NA	NA	8,400	9,700	6,900	7,000	6,200	5,400	NA	NA	--
Thallium		NA	NA	10 U	10 U	10 U	10 U	5 U	10 U	NA	NA	2
Vanadium		NA	NA	50 U	10 U	50 U	10 U	20 U	10 U	NA	NA	--
Zinc		ND	NA	20 U	21	20 U	25	20 U	27	NA	NA	--

All values are given in micrograms per liter (μg/L)

TABLE 5 (Continued)

ANALYTICAL RESULTS FOR DISSOLVED METALS IN GROUNDWATER

	Well:	P34C3		P34*C3		MW21L		MW(P)23C1		MW25B		
	Date:	October 1995		October 1995		June 1994		June 1994		June 1994		
Analyte	Laboratory:	IDEM	PRP	IDEM	PRP	IDEM	PRP	IDEM	PRP	IDEM	PRP	MCL
Aluminum		ND	NA	ND	NA	160	50 U	100 U	50 U	100 U	50 U	--
Antimony		NA	NA	NA	NA	60 U	30 U	60 U	30 U	60 U	30 U	6
Arsenic		ND	NA	10,700	NA	10 U	8.2	5 U	5 U	5 U	5 U	50
Barium		NA	NA	NA	NA	130	150	40	41	50	41	2,000
Beryllium		NA	NA	NA	NA	5 U	5 U	5 U	5 U	5 U	5 U	4
Cadmium		NA	NA	NA	NA	5 U	5 U	5 U	5 U	5 U	5 U	5
Calcium		NA	NA	NA	NA	70,000	77,000	77,000	90,000	1,000 U	85,000	--
Chromium		ND	NA	ND	NA	10 U	10 U	10 U	10 U	10 U	10 U	100
Cobalt		NA	NA	NA	NA	50 U	10 U	50 U	10 U	20 U	10 U	--
Copper		ND	NA	ND	NA	10 U	20 U	10 U	20 U	20 U	40 U	1,300
Iron		NA	NA	NA	NA	830	940	600	820	100 U	2,500	--
Lead		ND	NA	ND	NA	20 U	3.5	20 U	3 U	250 U	3 U	15
Magnesium		NA	NA	NA	NA	26,000	28,000	31,000	37,000	1,000 U	52,000	--
Manganese		NA	NA	NA	NA	80	90	40	54	10 U	160	--
Mercury		NA	NA	NA	NA	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	2
Nickel		ND	NA	ND	NA	10 U	10 U	10 U	10 U	10 U	10 U	100
Potassium		NA	NA	NA	NA	1,200	1,200	1,000 U	1,200	1,000 U	2,200	--
Selenium		NA	NA	NA	NA	20 U	5 U	20 U	5 U	50 U	5 U	50
Silver		NA	NA	NA	NA	10 U	10 U	10 U	10 U	10 U	10 U	--
Sodium		NA	NA	NA	NA	5,400	5,600	3,100	3,500	1,000 U	6,200	--
Thallium		NA	NA	NA	NA	500 U	10 U	500 U	10 U	100 U	10 U	2
Vanadium		NA	NA	NA	NA	50 U	10 U	50 U	10 U	50 U	10 U	--
Zinc		NA	NA	NA	NA	20 U	34	20 U	20 U	20 U	20 U	--

All values are given in micrograms per liter (μg/L)

TABLE 5 (Continued)

ANALYTICAL RESULTS FOR DISSOLVED METALS IN GROUNDWATER

Analyte	Well:	MW28B		MW33B		MCL
	Date:	June 1994		June 1994		
	Laboratory:	IDEM	PRP	IDEM	PRP	
Aluminum		100 U	50 U	170	50 UJ	--
Antimony		70	30 U	60 U	30 U	6
Arsenic		5 U	5 U	5 U	5 U	50
Barium		30	37	60	52	2,000
Beryllium		5 U	5 U	5 U	5 U	4
Cadmium		1 U	5 U	5 U	5 U	5
Calcium		70,000	86,000	95,000	100,000	--
Chromium		10 U	10 U	10 U	10 U	100
Cobalt		50 U	10 U	50 U	10 U	--
Copper		10 U	20 U	10 U	20 U	1,300
Iron		40	25 U	820	47 J	--
Lead		20 U	3 U	10 U	3 U	15
Magnesium		29,000	35,000	46,000	49,000	--
Manganese		40	53	180	180	--
Mercury		0.5 U	0.5 U	0.5 U	0.5 U	2
Nickel		10 U	10 U	20	10 U	100
Potassium		1,000 U	1,600	1,000 U	1,600	--
Selenium		20 U	5 U	5 U	5 U	50
Silver		10 U	10 U	10 U	10 U	--
Sodium		9,300	12,000	4,100	3,800	--
Thallium		500 U	10 U	10 U	10 U	2
Vanadium		50 U	10 U	5 U	10 U	--
Zinc		20 U	20 U	20 U	20 U	--

All values are given in micrograms per liter (μg/L)

TABLE 5 (Continued)

ANALYTICAL RESULTS FOR DISSOLVED METALS IN GROUNDWATER

Notes:

IDEM	=	Indiana Department of Environmental Management
PRP	=	Potentially responsible party
MCL	=	Maximum Contaminant Level; values given for copper and lead are action levels; "--" if no MCL exists
U	=	Analyte sought but not found; associated number is reporting limit
J	=	Result estimated for quality control reasons
ND	=	Analyte sought but not found; no reporting limit available
NA	=	Either sample was not analyzed or value not available

All values are given in micrograms per liter.
Two numbers in an entry are for field duplicate samples with different results.